NATIONAL CAR BUILDER

VOLUME XVI.
NUMBER 10.

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

$1.00 PER ANNUM
SINGLE NUMBERS TEN CENTS

NEW YORK:
Morse Building, 140 Nassau St.

OCTOBER, 1885.

Entered at the Post Office at New York N. Y., as Mail Matter of the Second Class.

CHICAGO:
187 Dearborn Street.

Fine Coach and Railway Varnishes.

CLARENCE BROOKS & CO.
MANUFACTURERS OF
VARNISHES,
Cor. West and West 12th Streets,
NEW YORK.

SEND FOR PRICE LIST.

CAR SEATS.

GEORGE BUNTIN & CO.,

SOLE MANUFACTURERS OF

Buntin's Patent Car Seats,

AND NICKEL PLATED ARM CAPS, IN USE ON RAILROADS GENERALLY.

No. 1,042 Ridge Ave., Philadelphia.

VOSE

Graduated Springs

FOR

CITY, FREIGHT & PASSENGER CARS.

RICHARD VOSE,

13 Barclay St., NEW YORK.

GEO. WESTINGHOUSE, Jr., President. T. W. WELSH, Superintendent. JOHN CALDWELL, Treasurer. W. W. CARD, Secretary. H. H. WESTINGHOUSE, General Agent.

THE WESTINGHOUSE AIR-BRAKE COMPANY,

Pittsburgh, Pa., U. S. A.,

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE,
WESTINGHOUSE LOCOMOTIVE DRIVER BRAKE,
VACUUM BRAKES (Westinghouse & Smith Patents),
WESTINGHOUSE FREIGHT BRAKE.

The Automatic Freight Brake is essentially the same apparatus as the Automatic Brake for passenger cars, except that the various parts are one piece of mechanism, and is sold at a very low price. The saving in accidents, flat wheels, brakemen's wages and the increased speed possible with perfect safety, will repay the cost of its application within a very short time.

The "AUTOMATIC" has proved itself to be the most efficient train and safety brake known. Its application is instantaneous; it can be operated from any car in the train, if desired, and should the train separate, or a hose or pipe fail, it applies automatically. A GUARANTEE is given customers against LOSS from PATENT SUITS on the apparatus sold them.

FULL INFORMATION FURNISHED ON APPLICATION.

GEORGE WESTINGHOUSE, Jr., President. ROBERT PITCAIRN, Treasurer. ASAPH T. ROWAND, Secretary.
C. H. JACKSON, Vice-Pres. & General Manager. HENRY SNYDER, General Agent.

THE UNION SWITCH AND SIGNAL CO.,

SOLE MANUFACTURERS OF APPROVED

RAILWAY INTERLOCKING, SWITCHING & SIGNALING APPLIANCES,

With Automatic Electric Locking, without which no interlocking is safe.

FROGS, CROSSINGS, SWITCHES AND SWITCH STANDS.

Catalogues, Plans and Estimates, with reference to about 500 apparatus in practical operation, will be furnished upon application.

OFFICE AND WORKS, corner Garrison Alley and Duquesne Way,
PITTSBURGH, PA., U. S. A.

BOUND VOLUMES OF THE

NATIONAL CAR-BUILDER

For 1880, 1881, 1882, 1883 and 1884.

Price, $3 Each.

CLIFF & RIGHTER CO.

(Limited.)

THEO. IRWIN, Pres. EDMUND K. RIGHTER, Sec
GEO. B. SLOAN, Treas. EDWARD CLIFF, Sup't.

MANUFACTURERS OF

RAILWAY CAR SPRINGS.

OSWEGO, N. Y.

REPRESENTED BY

LEHMAN B. HOIT.

Australia, New South Wales.

CARSON WOODS & CO.,

GENERAL MERCHANTS,

IMPORTERS OF

AMERICAN SPECIALTIES AND MANUFACTURERS' AGENTS.

SYDNEY, N. S. W.

The attention of Manufacturers and Export Agents is invited to the fact that the advertisers have special facilities for the introduction of new goods into the colonies of Australia. Patents and specialties of a useful and merchantable character will have our earnest and prompt consideration.

Cable Address: "Carsonwood, Sydney."

REFERENCES:

Hon. Geo. R. Dibbs M. P., Treasurer, Government N. S. W.
Messrs. Heney & Lacroix, Montreal, Can
Messrs. H. W. Peabody & Co., Boston, Mass.
Lyon Manufacturing Co., New York.
Manager Bank New Zealand, Sydney.
Wm. Brown, Esq., Quebec Bank, Quebec.

D. P. SLATTERY, President.
JOHN B. GRAY, V. P. & Gen. Mg'r.
E. B. LEIGH, Sec'y and Treas

American BRAKE Company,

S. W. McMUNN, Genl. Agent.
GEO. H. POOR, Mech. Supt.
ALBERT BLAIR, Attorney,

MANUFACTURERS OF

AUTOMATIC FREIGHT CAR BRAKES AND STEAM DRIVER AND TENDER BRAKES,

ST. LOUIS, MO.

We offer to Railway Companies the only Exclusively Independent Self-Acting Freight Train Brake which has yet been adopted by any Railway in the World. Our Steam Driver and Tender Brake is acknowledged to be the Cheapest, Simplest and BEST Power Brake now in use. Is now used by over 100 different Railroads.

CHARLES SCOTT.

ELLIPTIC AND SPIRAL SPRINGS FOR RAILWAY CARS AND LOCOMOTIVES.

1028 TO 1038 NEW MARKET STREET. PHILADELPHIA.

ASSIGNEE'S SALE OF THE $50,000 CAR SHOPS AT ANNISTON, ALA.!

ON TUESDAY, NOV. 3, 1885.

THE COMPLETE WORKS OF THE "ANNISTON CAR CO.," WITH ONE DRY KILN.

Five New Car Sheds, each 40 x 224 feet, with Wood and Iron Working Machinery, with capacity for turning out ten (10) freight cars per day; 6,000 feet of railroad track connecting with the three railroads centering here; seven two-room cottages.

All this property, covering six acres of land, will be sold in front of the office of said Car Works in Anniston, Ala., on Tuesday, Nov. 3, 1885, between the legal hours of sale.

Terms of sale, one-third cash, balance on one and two years' time, with interest and approved security.

These Car Works are located in the heart of the finest timber and mineral region in the South, with furnaces, foundries and rolling mills in same city, and lumber mills in close proximity, where merchantable materials of iron and wood can be had at first cost. This sale will be made under and by virtue of the power conferred by the DEED OF TRUST from the "Anniston Car Company."

N. B. FEAGIN, Trustee of Anniston Car Co.

CAR-BUILDERS' DICTIONARY.

COMPILED UNDER THE DIRECTION OF THE MASTER CAR-BUILDERS' ASSOCIATION.

REVISED EDITION PUBLISHED DECEMBER, 1884.

This book is twice as large as the original edition, and contains 2,188 engravings, including exact engravings of American Cars of every description, and of the different kinds of Trucks, Wheels, Brakes, Couplings, Seats, Lamps, Heaters, and all Car Furnishings in general use, in the minutest detail. All the detail drawings are made to scale, and each engraving is briefly described under the definition of its name. All terms in general use in car-building are defined. This is the most elegant, as well as the most valuable, book on American cars ever published, and forms a volume in character and appearance such as usually sold for $5.00. No one connected in any capacity with car-building can afford to be without a copy for study and reference.

WE OFFER

A Copy of the CAR-BUILDERS' DICTIONARY (Price $3.00) and Subscription to the NATIONAL CAR-BUILDER for one year (Price $1.00) for

$3.00.

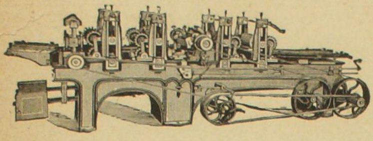
ADDRESS

THE NATIONAL CAR-BUILDER,
MORSE BUILDING, NEW YORK

ESTABLISHED 1832. **Stimson & Co.** Mfrs of Coach and Car Varnishes. 149 Milk St. BOSTON, MASS.

Ames Car Coupling Company,
F. W. PARSONS, Manager,
1430 South Penn Square, Philadelphia.

WOOD-WORKING MACHINERY,



—FOR—
Railroad Shops,
Planing Mills,
Car-Builders,
Cabinet, Carriage,
Sash, Door and
Blind Makers.

We received eight First-Class GOLD MEDALS at the World's Exposition, at New Orleans, La., on our Machinery, awarded by an experienced and practical Committee.

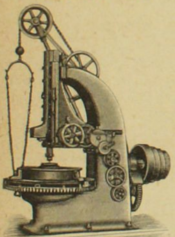
GOLD MEDAL for best Fast-Feed Flooring Machine.
GOLD MEDAL for best Molding Machine.
GOLD MEDAL for best Endless Bed Double Surfacer.
GOLD MEDAL for best Jointing Machine.
GOLD MEDAL for best Circular Saw Machine.
GOLD MEDAL for best Panel Planer.
GOLD MEDAL for best Shop Surfacer.
GOLD MEDAL for best Planing Machine for Matching Two Boards at a Time.

☞ Illustrated Catalogues on application.

S. A. WOODS MACHINE CO.

WAREROOMS:
91 Liberty St., New York; 172 High St., Boston; 61 South Canal St., Chicago.

WILLIAM SELLERS & CO.,



PHILADELPHIA.
Iron and Steel Working Machine Tools, for Railways, Machine Shops, Rolling Mills, etc.

PIVOT BRIDGES-SHAFTING.

THE 1876 INJECTOR BOILER-FEEDER.
SIMPLE, RELIABLE AND EFFECTIVE.
Started, Regulated and Stopped by One Motion of a Lever.
Pneumatic Fire for Extinguisher, use in Passenger and Freight Cars Buildings, etc.

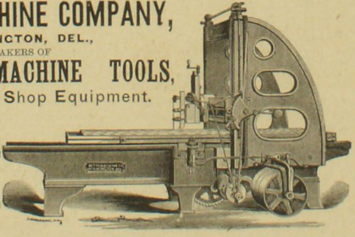
Branch Office: 79 Liberty Street, New York.

BETTS MACHINE COMPANY,

WILMINGTON, DEL.,
MAKERS OF

IMPROVED MACHINE TOOLS,

For Railway Shop Equipment.



Wheel Lathes,
Wheel Presses,
Wheel Borers,
Slotters, Shapers,
Planers, Drills.

New England Agents, HILL, CLARKE & CO., BOSTON, MASS.

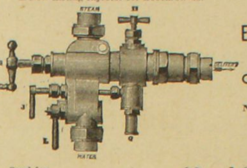
NOW IS THE TIME TO BUY
THE HANDSOMEST! CHEAPEST! BEST!
OUR CORRUGATED IRON ROOFING,
SIDING, CEILING, ARCHES, LATH, Etc.

The Cincinnati Corrugating Co.,
CINCINNATI, OHIO.

Send for Illustrated Catalogue and Bottom Price

FRIEDMANN'S PATENT LOCOMOTIVE INJECTORS

THE "MONITOR,"
A New Lifting Injector for Locomotives.



Send for Descriptive Circular.

Lifting and Non-Lifting, with all Latest Improvements.

EJECTORS FOR WATER STATIONS
Construction Trains Etc.

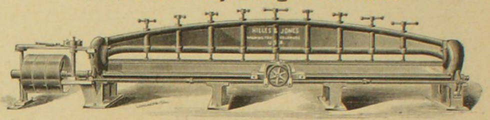
OILERS, LUBRICATORS, Etc.

New Patent Boiler Washer and Fire Extinguisher.

NATHAN MFG. CO.,
92 and 94 Liberty Street, New York.

BOILER PLATE PLANER.

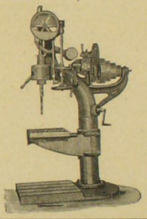
Will Plane any Length of Plate.



Tools cut both ways and have independent adjustment. Table acts as a gauge for setting the Plate. Driven by a Steel Screw, which is supported its entire length so that it cannot be bent or sprung.

HILLES & JONES, Wilmington, Del.

BEMENT, MILES & CO., Philadelphia,

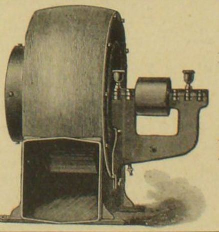


MANUFACTURERS OF
METAL WORKING

MACHINE TOOLS

Of all descriptions, and a great number of sizes, including
Lathes, Planers, Drills, Shapers, Slotters, Milling and Boring Machines,
Steam Hammers, Steam and Hydraulic Riveters, Cranes, Punches and Shears, Bending Rolls, Plate Planers, etc., etc.

BUFFALO SHAVING & VENTILATING EXHAUST FANS



IN ALL THEIR VARIETY,
For Every Possible Duty.

WARRANTED SUPERIOR TO ANY OTHER MAKE

In Economy, Durability and Effectiveness.

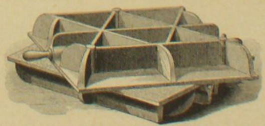
BUFFALO FORGE CO.,
BUFFALO, N. Y.

BROWN & SHARPE M'F'G CO.,

MAUNFACTURERS OF

MACHINERY AND TOOLS,

PROVIDENCE, R. I.



SIZES AND PRICES OF SURFACE PLATES.

4½ in. × 6 in.	$5.00	9 in. × 9 in.	$12.00	12 in. × 12 in.	$22.00	16 in. × 16 in.	$40.00
6 in. × 6 in.	6.00	9 in. × 14 in.	19.00	12 in. × 18 in.	33.00	18 in. × 18 in.	48.00
6 in. × 12 in.	11.00	10 in. × 15 in.	25.00	14 in. × 14 in.	30.00	18 in. × 36 in.	98.00
6½ in. × 18 in.	18.00	10 in. × 30 in.	45.00	14 in. × 18 in.	37.00	24 in. × 24 in.	88.00

THE E. D. ALBRO COMPANY,

MAHOGANY.

MANUFACTURERS OF

VENEERS, CAR-BUILDERS' MATERIAL

FROM DOMESTIC AND FOREIGN WOODS.

685--711 West 6th St., **CINCINNATI, O.**

Estimates and Price Lists Furnished.

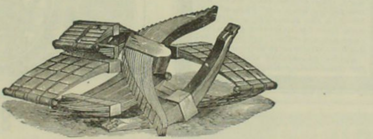
THE A. FRENCH SPRING CO., Limited,

PITTSBURGH, PA.,

MANUFACTURERS OF

EXTRA TEMPERED, ELLIPTIC AND SPIRAL SPRINGS OF ALL DESCRIPTION.

OFFICERS:
AARON FRENCH, Chairman.
JULIUS E. FRENCH, Vice-Chairman.
GEO. W. MORRIS, General Manager.
D. C. NOBLE, Secretary and Treasurer.
W. P. HANSELL, General Superintendent.



OFFICES AND WORKS:
20th and Liberty Streets,
21st and Liberty Streets,
25th and Smallman Streets,
PITTSBURGH, PA.

ALL SPRINGS MADE OF THE BEST QUALITY CRUCIBLE STEEL,
WITH PATENT HOT COMPRESSED BANDS FOR RAILROAD CARS AND LOCOMOTIVES.

UNITED STATES CENTENNIAL COMMISSION, OFFICIAL REPORT.—Diploma and Medal awarded for Good Design, Excellence of Workmanship and Material, Uniformity of Action and Durability.

HANSELL'S PATENT KEG-SHAPE STREET CAR SPRINGS.

NEW YORK:
88 Boreel Building,
H. J. GERIKEN, Agt.

BOSTON:
52 Mason Building,
JNO. KENT, Agt.

CHICAGO:
Rooms 13 and 14 Adams' Express Building,
183 Dearborn St.
JOS. M. ROGAN, Agt.

JOHN WILEY & SONS, 15 Astor Place, New York,

HAVE NOW READY

THE ARCHITECT'S AND BUILDER'S POCKET-BOOK, a thoroughly practical work, especially adapted to the needs of American Architects, Builders, Contractors and Draughtsmen. Treating of Mensuration, Geometry, Trigonometry, Rules, Tables, and Formulas relating to the Strength and Stability of Foundations, Walls, Buttresses, Piers, Arches, Posts, Ties, Beams, Girders, Trusses, Floors, Roofs, etc., etc., with Statistics and Tables relating to Carpentry, Masonry, Drainage, Painting and Glazing, Plumbing, Plastering, Roofing, Heating and Ventilation, Weights of Materials, Capacity and Dimensions of Churches, Theatres, Domes, Towers, Spires, etc., etc. By F. E. KIDDER, C. E., Consulting Architect. Morocco, round corners; 600 pages; 408 engravings. Price, $3.50.

CROMWELL'S TREATISE ON TOOTHED GEARING. Containing complete instructions of Designing, Drawing and Constructing Spur Wheels, Bevel Wheels, Lantern Gear, Screw Gear, Worms, etc., and the proper formation of Tooth Profiles. For the use of Machinists, Pattern Makers, Draughtsmen, Designers, Scientific Schools, etc.; with many plates. 12mo, cloth. $2.

SINCLAIR'S LOCOMOTIVE ENGINE, RUNNING AND MANAGEMENT. A practical Treatise on the Locomotive Engine, with particulars, showing their performance in running different kinds of trains with dispatch and economy, and directions regarding the Care, Management and Repairs of Locomotives and all their connections. Illustrated by numerous engravings. Second edition. 12mo, cloth. $2.

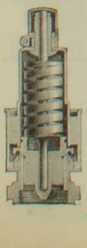
THURSTON'S STATIONARY STEAM ENGINES. Especially adapted to Electric Lighting Purposes. Treating of the Development of Steam Engines, the Principles of Construction and Economy, with Description of Moderate-Speed and High-Speed Engines. 8vo, cloth. $1.50.

*** MAILED AND PREPAID ON THE RECEIPT OF THE PRICE.

RICHARDSON'S PATENT INCASED

LOCOMOTIVE POP "SAFETY" VALVE,

WITH PATENT ADJUSTABLE SCREW RING.



The cut represents our new pattern Incased Locomotive "Pop" Safety Valve. The spring is *nickel plated* to protect it from corrosion. The construction of the case is such as to *greatly reduce* the noise of escaping steam. The capacity of the Richardson Valve to relieve a boiler is greater than that of *any other make*. They can be furnished with relief levers when required.

By a decision of Supreme Court, Washington, D. C., Jan. 19, 1885, our Patents were declared Valid, and we were awarded Profits and Damages against Crosby Steam Gauge and Valve Co. and a Perpetual Injunction.

We make Special Prices to Railroads and Locomotive Builders.

☞ *SEND FOR CATALOGUE.* ☜

The Consolidated Safety Valve Co.,

SOLE OWNERS AND PROPRIETORS.

Salesroom:
111 LIBERTY ST., N. Y.

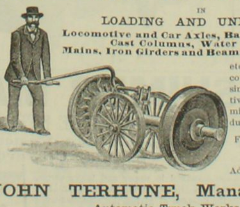
Factory:
BOSTON, MASS.

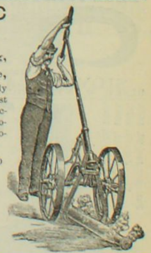
THIS TRUCK IS AUTOMATIC

IN

LOADING AND UNLOADING

Locomotive and Car Axles, Bar Iron, Shafting, Cast Columns, Water and Gas Mains, Iron Girders and Beams, Timber, Stone, etc., and is universally conceded to be the most simple, ingenious, effective, durable and economical machine yet produced.





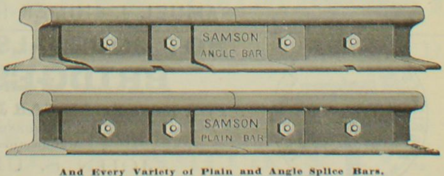
FOR ILLUSTRATED CATALOGUE

Address

JOHN TERHUNE, Manager,
Automatic Truck Works,
P. O. Box 19. MIDLAND PARK, N. J.

CHICAGO SPLICE BAR MILL.

MORRIS SELLERS & CO., Sole Proprietors and Manufacturers of the Celebrated "SAMSON" BAR



And Every Variety of Plain and Angle Splice Bars.

OFFICE, 6 ASHLAND BLOCK .. .. Mill, Chicago Av., and the River .. . .. CHICAGO.

ROANOKE MACHINE WORKS,

ROANOKE, VIRGINIA,

BUILDERS OF

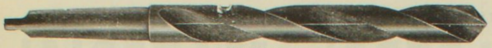
FREIGHT CARS (CAPACITY, 8 CARS PER DAY) AND FIRST-CLASS CAR WHEELS

Out of the Best Charcoal Iron.

Capacity, 50 Car Wheels per day.

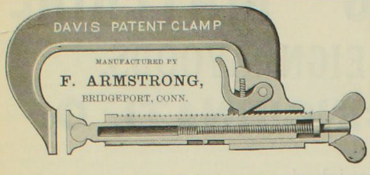
ALSO BUILD LOCOMOTIVES OF ANY DESCRIPTION.

MORSE TWIST DRILL AND MACHINE COMPANY



MANUFACTURES

Patent Twist Drills, Machine Bits for Wood, Bit Stock Drills, Reamers, Standard Gauges, Milling Cutter and Special Tools, for use in Railroad, Car and Locomotive Shops. **NEW BEDFORD, Mass.**



PRICE LIST

Dozen.

No. 1, opens 3 in.....$7.50
" 2, " 5 "..... 8.50
" 3, " 7 "..... 12.00

Sold by Leading Hardware Dealers.

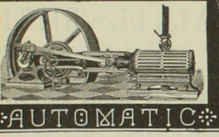
The new Clamp represented in the above cut, on account of combining the qualities of quick adjustment and durability, recommends itself as the most practical tool of the kind ever offered in the market It has the especial advantage over all others in clamping the work without displacement, being so constructed that in operating the plunger or screw it does not turn as in all other clamps, but is forced directly on the work by the thumb-screw.

These clamps are made of the best malleable iron, and a trial of them will prove the justice of my claim for their being not only the cheapest and easiest working, but the only practical adjustable clamp made.

THE CUMMER ENGINE CO.

CLEVELAND OHIO

SEND FOR 150 PAGE ILLS CATALOGUE.



AUTOMATIC

Awarded highest premiums at Cincinnati and Louisville Expositions of 1883, for "Best Automatic Engine." We will furnish anyone copies of the ORIGINAL ENTRIES of several engine builders who claim they were not competing with us. They all entered in the same class with us, and now by deceptive Circulars (one headed "Fact versus Falsehood,") attempt to mislead.

☞ *No premiums were offered for Condensing Engines.*

PORTABLE FORGES.

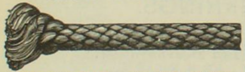
Send for Catalogue to

EMPIRE PORTABLE FORGE CO.,

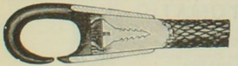
COHOES, N. Y.

SOLID BRAIDED BELL CORD

PLAIN AND FANCY COLORS



BELL-CORD COUPLINGS.

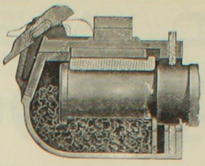


MANUFACTURED BY

SILVER LAKE CO.

HENRY W. WELLINGTON, Agent, BOSTON

THE HEWITT BOX-LID CO.,



142 DEARRBORN ST.,

CHICAGO, ILL.

Eastern Office: Room 14, Fifth Floor, Mills Building, New York.

We respectfully refer you to the following railroads using the Hewitt Cover:

K. C., St. J. & C. B.; M. R., Ft. S. & G.; C., B. & Q.; C., A. & St. L., T. & S. F.; A. & N.; K. P.; F. & P. M.; D., L. & N.; D. & C.; M. C.; H. & St. J.; C. & V.; St. L., I. M. & S.; B. & M. R. (in Neb.); D.P.; L. L. & G.; L. E. & W.; L. P. & C.; I. C.; O. C., St. L. V. & T. H.; St. P. & S. C.; N. P.; C. & E. I.; M. P.

$ $ $ $ **SAVED** $ $ $ $

1977 NINETEEN HUNDRED SEVENTY-SEVEN 1977

MACHINES

BOTH NEW AND SECOND-HAND

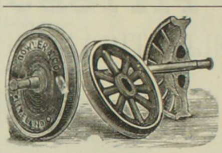
COMPRISING MACHINE AND BLACKSMITH TOOLS OF EVERY DESCRIPTION. WOOD-WORKING MACHINERY IN ALL ITS BRANCHES. PORTABLE ENGINES. UPRIGHT and HORIZONTAL STATIONARY ENGINES, 1 TO 300 HORSE POWER. **S.C.F.&CO.** LOCOMOTIVE FIRE-BOX, HORIZONTAL, and UPRIGHT BOILERS, 1 TO 100 HORSE POWER. WATER WHEELS, COTTON AND WOOLEN MACHINERY, STEAM PUMPS, GRISTMILL MACHINERY, Etc., FULLY DESCRIBED, AND PRICES ANNEXED,

☞ Send stamp for same,] In our List No. 23. [stating what you want. ☜

We have the Largest Assortment of Machinery to be found in the hands of any firm in the country.

Works and Main Office, Manchester, N. H. **S. C. FORSAITH & CO.**

Branch Office and Wareroom, 209 Center street, New York City.



CLEVELAND FOUNDRY.

Car Wheels of All Kinds and Sizes

WITH OR WITHOUT AXLES.

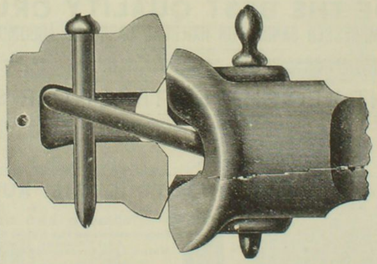
CHILLED-FACED RAILROAD FROGS.

Street Railroad Turnouts.

ROLLING MILL AND MACHINERY CASTINGS.

Nos. 9, 11 and 13 Winter St. Cleveland O.

BOWLER & CO.



SAFFORD'S SAFETY DRAW-BAR.

"VICTORY OVER MORE THAN 30 CONTESTANTS."

Victory over more than 30 Self-Couplers in the Master Car-Builder's Convention of June, 1876. Also indorsement for safety in coupling by the Yard Masters, in their Convention, June, 1877, and by 300 others who were unable to attend the Convention, and 300 railroad officials who are resident in 26 States, and who admitted superiority over any other yet produced. Try 30 free of royalty, and see for yourself! Pattern free, and no change in timbers or connections. Those made by Wilson, Walker & Co., Pittsburgh, Pa., *will save 200 per cent. in repairs*, and give double life service over *old styles of* wrought iron. About 43,000 in use by 146 railroads. The *saving in repairs* by using *my invention* is from 20 per cent. to 80 per cent. as per *report o many officers.*

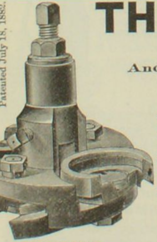
J. B. SAFFORD,

EAGLE IRON WORKS

BUFFALO, N. Y.

THE SHIMER MATCHER HEADS.

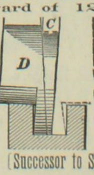
Patented Jan. 26, 1872.
" July 27, 1875.
Reissued Oct. 12, 1880.
Patented July 18, 1882.



TONGUE HEAD.

THE CHEAPEST! THE STRONGEST! THE MOST DURABLE!

And yet the Lightest and Easiest Running Matcher Heads in the World. Upward of 12,000 Sold.

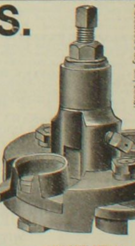


The Bits are arranged in upper and lower series, and secured to a Head having seats alternately inclined for the purpose of giving the side clearance to their cutting points. This explains why these Bits hold their shape and turn out standard work until used up; the entire circle of Bit being tool cutting edge.

This diagram represents a Bit (*D*) in the position it occupies when making a cut: the Bit (*C*) which follows to complete the work is given in outline. This explains the division of cut and the free and easy working of the Tool. They finish hard cross-grained and knotty lumber neatly, showing clean-cut edges and often *save their cost in one day's run.*

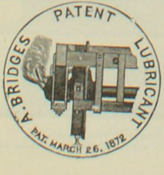
We also make **Ship Lap Heads, Jointer Heads, Dado Heads, Sash Heads, Door Heads, Cope Heads** and Heads for any special work where a perfectly uniform pattern is required. Send for Descriptive Circular.

Patented Jan. 26, 1875.
" July 27, 1875.
Reissued Oct. 12, 1880.
Patented July 18, 1882.



GROOVE HEAD.

SAMUEL J. SHIMER (Successor to Shimer & Co.), Milton, Penn.



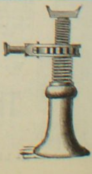
HOT JOURNALS ENTIRELY PREVENTED.

BRIDGES' LUBRICANT

FOR RAILROAD CAR JOURNALS AND OTHER BEARINGS.

SAMPLES FURNISHED GRATIS. SEND FOR CIRCULAR.

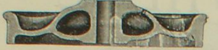
Manufacture Ball's Telescopic Screw Jack.



JOHN S. URQUHART, Successor to

ALBERT BRIDGES, 46 CORTLANDT STREET, NEW YORK.

LEWIS H. TAYLOR, Pres.
S. P. RABER, Sup't. and Treas.
L. S. VANDERBEEK, Sec. and Asst. Treas.
New York Office, - - 91 Liberty st.



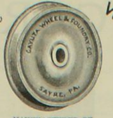
TAYLOR IRON WORKS,

High Bridge, N. J.,
MANUFACTURERS OF
Chilled Iron Car-Wheels, Steel-Tired Wheels, Car and Locomotive Axles and Draw Hooks

---

Best Chilled Iron

CAR WHEELS.


CAYUTA WHEEL & FOUNDRY CO.
SAYRE, PA.

MANUFACTURED BY
CAYUTA WHEEL AND FOUNDRY CO.
SAYRE, PA.
HOWARD ELMER, President. M. C. CHAPMAN, Supt.

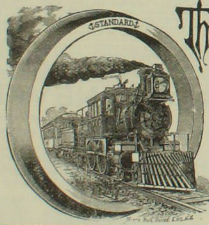
PARDEE CAR WORKS,

WATSONTOWN, PA.
PARDEE, SNYDER & CO. [Limited], Proprietors.
C. W. LEAVITT, Agent, 161 Broadway, Room 2, N. Y.

SOUTHERN CAR WORKS,

MANUFACTURERS OF
RAILROAD CARS,
Box, Flat, Gondola, Ore, Mining, Etc.
KNOXVILLE, TENN.

THE MIDVALE STEEL CO. PHILA. PA.
CAST STEEL
LOCOMOTIVE AND CAR WHEEL
TIRES
AXLES
FORGINGS CASTINGS
BAR STEEL
MIDVALE S. Co. ★



The STANDARD STEEL WORKS.

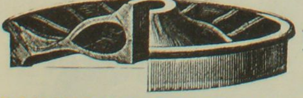
Manufacturers of
Locomotive and Car Wheel
TIRES.
Office 220 South Fourth St.
PHILADELPHIA, PA.

LEHIGH CAR MANUFACTURING COMPANY

MANUFACTURERS OF
Box, Gondola, Flat, Coal, Ore Drift or Mine Cars. Capacitv, 16 Cars Per Day.
Stemton, Northamnton Co., Pa. New York Office, 91 Liberty St., Room 4.
H. H. FISHER, President. G. H. STEM, Supt. B. E. LEHMAN, Vice-President.

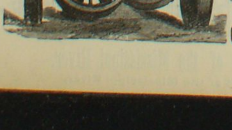
CARLISLE MANUFACTURING CO.,

MANUFACTURERS OF
FREIGHT CARS, BOX, STOCK, GONDOLA, IRON HOPPER, COAL and MINING CARS,
ENGINES and MILL MACHINERY,
CARLISLE, PA.



WASON

MANUFACTURING CO.
SPRINGFIELD, MASS
BUILDERS OF
RAILWAY CARS OF ALL DESCRIPTIONS,
CAR WHEELS AND RAILWAY CASTINGS.
H. S. HYDE, Treasurer. G. C. FISK, President.



MOWRY

CAR WHEEL WORKS,
CINCINNATI, O.

Manufacturers of CAR WHEELS of all descriptions. Wheels and Axles, Chilled Tires; Engine, Car and Bridge Castings, of any pattern, furnished to order at short notice. Wheels of all sizes constantly on hand.

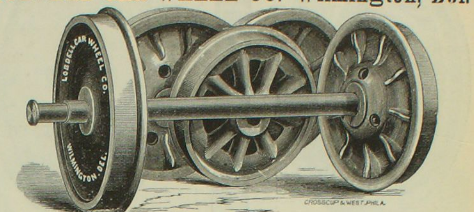
WORKS: Eastern Ave. and Lewis St.
OFFICE: 27½ W. Third St. Cincinnati, O.

ESTABLISHED 1847.

A. WHITNEY & SONS' CAR WHEEL WORKS,

PHILADELPHIA, PA.

LOBDELL CAR WHEEL CO. Wilmington, Del.


LOBDELL CAR WHEEL CO.
WILMINGTON, DEL.
CROSSCUP & WEST PHILA.

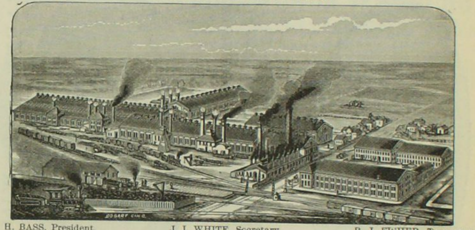
Single and Double Plate and Hollow Spoke Wheels for Steam Roads. Also, Solid and Open Plate Wheels for Street Roads.

GEO. G. LOBDELL, President. GEO. G. LOBDELL, JR., Secretary. WM. W. LOBDELL, Vice-President. P. N. BRENNAN, Treasurer.

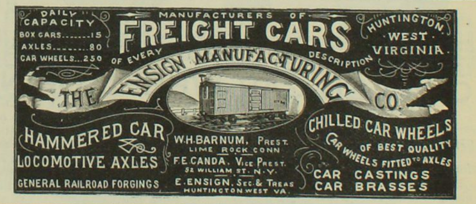
ESTABLISHED 1853 INCORPORATED 1873

BASS FOUNDRY AND MACHINE WORKS.

MANUFACTURERS OF
Steam Engines, Boilers, Heavy Machinery, Car Wheels and Railroad Castings, Car Axles and Forgings.



J. H. BASS, President. J. I. WHITE, Secretary. R. J. FISHER, Treasurer
FORT WAYNE, IND.



DAILY CAPACITY
BOX CARS.......15
AXLES.........80
CAR WHEELS...250

MANUFACTURERS OF
FREIGHT CARS
OF EVERY DESCRIPTION

HUNTINGTON, WEST VIRGINIA.

THE ENSIGN MANUFACTURING CO.

HAMMERED CAR & LOCOMOTIVE AXLES
GENERAL RAILROAD FORGINGS

W. H. BARNUM, PREST.
LIME ROCK CONN
F. E. CANDA, VICE PREST.
52 WILLIAM ST. N. Y.
E. ENSIGN, SEC. & TREAS
HUNTINGTON WEST VA.

CHILLED CAR WHEELS OF BEST QUALITY
CAR WHEELS FITTED TO AXLES
CAR CASTINGS
CAR BRASSES

THE HARLAN & HOLLINGSWORTH CO.,

CAR BUILDERS,
WILMINGTON, DEL.

Established in - - - - - - 1836.

STEEL CASTINGS

FROM 1-4 to 15,000 lbs. WEIGHT.

NINE THOUSAND Cross-Heads of this steel are now running on locomotives, some for 11 years, showing a better record than any cross-heads whatever.

ROCKERS, PISTON HEADS, DRIVER BOXES, ETC
STEEL CASTINGS OF EVERY DESCRIPTION.
Send for Circulars and Prices to
CHESTER STEEL CASTINGS CO.,
407 Library St., PHILADELPHIA. Works: CHESTER, Pa.

KRUPP COMPOUND.

THE STANDARD COOLER.

This compound as a cooler and lubricator for **Hot Journals** is unsurpassed.

Is best applied as a dope by mixing well with waste saturated with oil, and packing close to the journal.

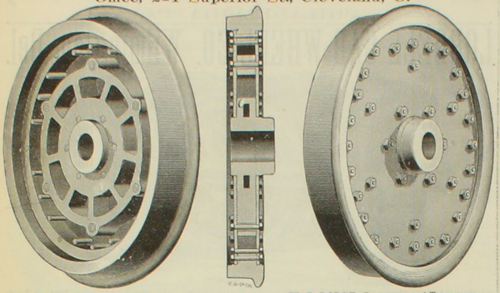
E. A. SMITH & CO.,
P O. Box 1,145. Pittsburgh, Pa.

PAIGE CAR WHEEL CO.,

MANUFACTURERS OF

PAIGE'S PATENT WROUGHT METAL WHEELS.

Office, 211 Superior St., Cleveland, O.

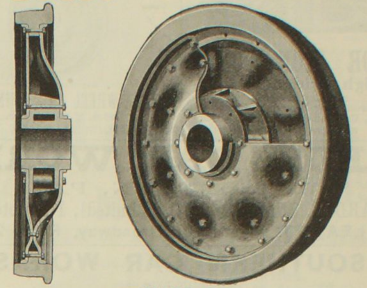


J. E. FRENCH, President. W. S. DODGE, Secretary and Treasurer.

Adapted for Sleeping and Drawing Room Cars, Locomotive and Tender Trucks. Steel Tires, four inches hick, with ½ inch Plates, securely bolted, making it a perfectly Safe, Durable and Noiseless Wheel.

THE STEEL TIRED SPRING PLATE CAR WHEEL

HAS NO RIGID CONNECTION BETWEEN TIRE AND AXLE.



IS LIGHT, STRONG AND CHEAP. SEND FOR CIRCULAR.

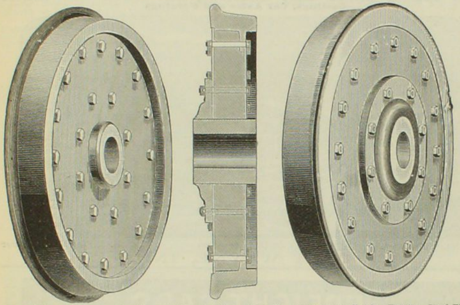
—MADE BY—

The Dickson Manufacturing Co.,

SCRANTON, PA.

ALLEN PAPER CAR WHEEL COMPANY,

General Offices: 239 Broadway, N. Y.



MANUFACTURERS OF ALLEN'S PATENT PAPER CAR WHEEL.

Especially adapted for Sleeping and Drawing-Room Cars, Locomotive and Tender Trucks. Steel Tire with Annular Web—Strongest, Most Durable, and Most Economical Wheel in use. 74 manufactured in 1877; 60,000 manufactured to date; present facilities, 36,000 per year. Works at Hudson, N. Y., at Pullman, and at Morris, Ill.

A. G. DARWIN, President. J. C. BEACH, Treasurer. C. H. ANTES, Secretary.

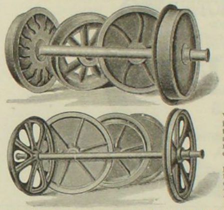
THE JERSEY CITY WHEEL FOUNDRY AND MACHINE WORKS,

MANUFACTURERS OF

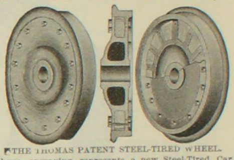
CAR WHEELS,

P. O. Box 129,

JERSEY CITY, N. J., U. S. A.



Wheels loose or fitted to Axles for every variety of Railroad Service.



THE THOMAS PATENT STEEL-TIRED WHEEL.

The above engraving represents a new Steel-Tired Car Wheel having practically an indestructible non-metallic bearing for the tire, of sufficient depth to intercept and destroy the vibrations common to ordinary chilled iron car wheels, and steel-tired wheels in which the tire rests directly upon a metallic centre, thus producing a noiseless wheel and one securing increased life for the tire and axle.

This is accomplished by casting a centre having a series of pockets or recesses on its circumference, **opening outward,** formed by the back plate of the casting extending to the top of the pocket, and the front plate to about half the height of the pocket, and separated from each other by radial metal walls. Into these pockets are forced from the periphery of the casting wedge shape blocks of wood, so treated that there is no possibility of shrinkage or deterioration. The wooden blocks before insertion are of such size that the pressure necessary to seat them secures their retention in the pockets when the pressure is removed, and when turned off to receive the tire they extend slightly beyond the radial walls, the tire thus bearing only on wood. To secure the tire to the centre, bolts pass through the internal flange and the radial walls, and, having a bearing in metal their entire length, held more firmly than when allowed to pass in part through the cushioning material.

Attention is called to the wheel as one of few parts, to the facility with which it may be refitted with new tire, and that the life of the wooden bearing is measured by the number of times the casting will admit of refitting to axle.

The wheel is manufactured by The Jersey City Wheel Foundry and Machine Works.

For further information address THEODORE THOMAS, P. O. Box 129, Jersey City, N. J.

CHILLED CAR WHEEL GRINDING CO., CARSON, NEVADA.

Patented in United States and Canada.

H. M. YERINGTON, President. A. C. ELLIS, Vice-President. G. F. FORD, Secretary and Treasurer.

The CHILLED CAR WHEEL GRINDING MACHINE, which we now introduce, is no hasty device. It is the result of four and one-half years experience, and during that time has received a most thorough test, with satisfactory results.

Railroad officials, upon reflection, will admit it is more essential to have a machine to true up Chilled Car Wheels than a Tire Lathe for turning locomotive tires, for this reason: four or more driving wheel tires are required for one engine; a greater number of Car Wheels compose a train; hence the necessity of this invention.

The great hardness of the chilled tread has hitherto rendered the operation of turning them impracticable, owing to the great expense, which made it cheaper to frequently replace the worn wheels with new ones. To obviate these objections and reduce the cost of this process, we furnish a machine capable of making a perfect wheel at small expense.

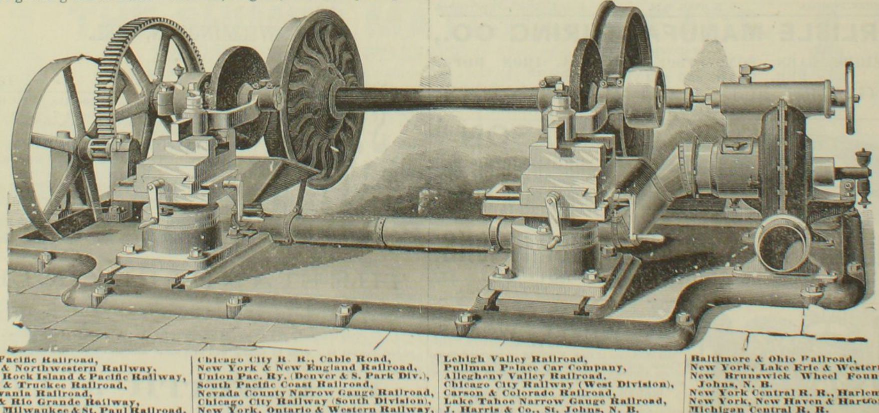
Wheels with flat places, and otherwise badly worn, that are ordinarily condemned and used for scrap iron, can be ground and fitted so as to double their original mileage. This alone makes our machine the greatest money saver ever introduced to railroads.

A sound Chilled Car Wheel trued by our method cannot be excelled by a paper or any other description of Car Wheel with steel tire.

Any person having a slight acquaintance with tools may, after five hours' instruction, become thoroughly competent to operate our machine.

Allowing all new wheels to be 3-32 inch oval, if properly fitted to axles, our machine *will* true up one pair an hour.

We manufacture expressly for use with our machine, Abrading Wheels, which, as the result of a series of experiments and long experience, we guarantee to be the best grinding wheels made. No odor, no glaze, and we defy competition.



Central Pacific Railroad,
Chicago & Northwestern Railway,
Chicago, Rock Island & Pacific Railway,
Virginia & Truckee Railroad,
Pennsylvania Railroad,
Denver & Rio Grande Railway,
Chicago, Milwaukee & St. Paul Railroad.
Canadian Pacific Railroad (Yale B. C.),
Chicago City R. R., Cable Road,
New York & New England Railroad,
Union Pac. Ry. (Denver & S. Park Div.),
South Pacific Coast Railroad,
Nevada County Narrow Gauge Railroad,
Chicago City Railway (South Division),
New York, Ontario & Western Railway,
Utah Cent. Railway,
Lehigh Valley Railroad,
Pullman Palace Car Company,
Allegheny Valley Railroad,
Chicago City Railway (West Division),
Carson & Colorado Railroad,
Lake Tahoe Narrow Gauge Railroad,
J. Harris & Co., St. Johns, N. B.
A., T. & S. Fe Railway,
Baltimore & Ohio Railroad,
New York, Lake Erie & Western,
New Brunswick Wheel Foundry Johns, N. B.
New York Central R. R., Harlem Div.
New York, New Haven & Hartford R. R
Michigan Central R. R.

We are prepared to sell machines outright, or to furnish them on royalty for each pair of wheels trued.

THE ALLENTOWN ROLLING MILLS, Allentown, Pa., Manufacturers and Financial Agents East of the Mississippi River.

NORTH STAR IRON WORKS CO., Minneapolis, Minn., Manufacturers and Financial Agents West of the Mississippi River.

THE BALTIMORE CAR WHEEL COMPANY,

MANUFACTURERS OF

CHILLED WHEELS OF ALL PATTERNS AND SIZES, FOR EVERY SERVICE, AND WITH OR WITHOUT AXLES.

CAPACITY, 400 WHEELS PER DAY.

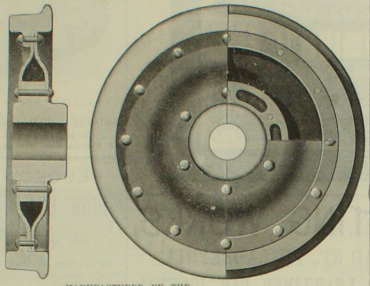
W. S. G. BAKER, *President and Treasurer.*
J. PAUL BAKER, *Secretary.*

OFFICE AND WORKS Fulton Junction, Baltimore, Md.

THE THURBER STEEL WHEEL,

The special claims which we make for this wheel are:

First—Simplicity of construction.
Second—Facility and economy of repairs and renewals.
Third—An elastic reception of concussions in service.
Fourth—Durability as a result of the general excellence of the wheel.



MANUFACTURED BY THE

BROOKS LOCOMOTIVE WORKS,
DUNKIRK, NEW YORK.

BRADLEY CAR WORKS, WORCESTER, MASS.

ESTABLISHED 1833.

MANUFACTURERS OF EVERY DESCRIPTION OF

RAILWAY CARS.

OSGOOD BRADLEY & SONS, Proprietors.

NEW YORK OFFICE No. 115 Broadway, R. CANNING, Agent.

I. N. PENNOCK. W. PENNOCK.

PENNOCK BROS.,

MANUFACTURERS OF

RAILWAY CARS,

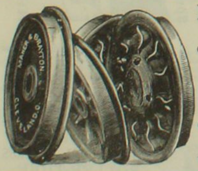
MINERVA, OHIO.

TIFFANY REFRIGERATOR CAR CO.,

164 DEARBORN ST., CHICAGO, ILL.

1,500 in Use.

CLEVELAND WHEEL AND FOUNDRY WORKS,



MAHER & BRAYTON, Proprietors.

MANUFACTURERS OF

CAR, ENGINE, TRUCK AND TENDER WHEELS, RAILROAD, ROLLING-MILL AND MACHINERY CASTINGS, AND STREET RAILROAD WHEELS AND TURNOUTS.

ALSO,

CHILLED-FACED RAILROAD FROGS.

Office: 20 Carter Street.

Works: Cor. Carter and Collins Streets, Cleveland, O.

KNOXVILLE CAR WHEEL CO.,

Knoxville, Tenn.,

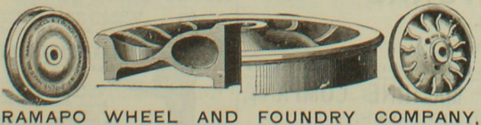
MANUFACTURE

CHILLED WHEELS FOR CARS,
ENGINE TRUCKS AND TENDERS,

USING STRICTLY

COLD BLAST CHARCOAL IRON,

Made at their Celebrated Carter Co. Furnaces.



RAMAPO WHEEL AND FOUNDRY COMPANY,

MANUFACTURERS OF

Chilled Wheels for Drawing-Room and Sleeping Coaches, Locomotives, Tenders, Passenger and Freight Cars.

GEO. CHURCH, President and Treasurer. W. W. SNOW, Superintendent and General Manager.

RAMAPO, ROCKLAND COUNTY, N. Y.

DAVENPORT & FAIRBAIRN,

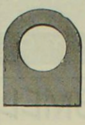
ERIE, PA.

MANUFACTURERS OF

CAR WHEELS.

Capacity 350 Wheels per day. Wheels made by improved process. Far more durable than those made in the ordinary way.

VULCANIZED FIBRE CO.,



SOLE MANUFACTURERS OF

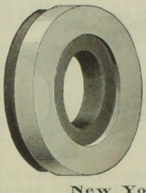
HARD AND FLEXIBLE
VULCANIZED FIBRE.

Flexible Vulcanized Fibre Dust Guards and Oil-Box Covers,

being absolutely unaffected by oil or heat, are far more durable and efficient than Leather, and much cheaper.

THE NEW

"IRON-CLAD" FIBRE TRACK WASHERS.



PERFECTED BY TEN YEARS' EXPERIENCE.

Surpassing all other Nut-Lock Devices in

Durability, Effectiveness and Cheapness.

Strengthened and Protected from Weather.
Cannot be Crushed or Burst.
Will not Lose their Elasticity, nor Rot.
Adapted for both Plain and Angle-bars.

VULCANIZED FIBRE CO.

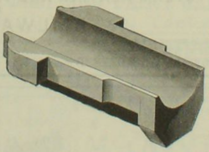
WILMINGTON, DEL.

New York Office, No. 15 Dey Street.

—THE—

ORIENTAL METAL MFG. CO.

C. L. VAN WORMER, Pres. WM. SLEFFEL, Gen'l Mgr.



Oriental Metal is superior to all other metals known to the trade for general Machine Castings, and for Bearings of all kinds, Thrust Rings, Slide Valves, Cross-Head Gibs, Piston Rings, Pinions, Cog Wheels, Steam Whistles, etc., etc. Is anti-frictional. All Castings guaranteed. Price as low as any other leading metals.

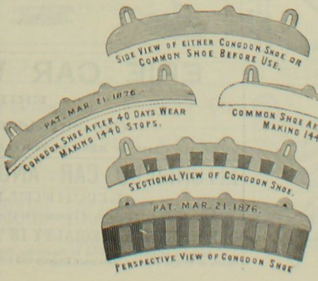
SOLE PROPRIETORS AND MANUFACTURERS OF

ORIENTAL METAL,

FOR RAILROAD CARS, LOCOMOTIVES, STEAMSHIPS AND MACHINERY BEARINGS.

48 CONGRESS STREET, BOSTON. (WORKS: EAST BOSTON.)

CONGDON'S IMPROVED CAR BRAKE SHOE.


SIDE VIEW OF EITHER CONGDON SHOE OR COMMON SHOE BEFORE USE.
PAT. MAR. 21. 1876.
CONGDON SHOE AFTER 40 DAYS WEAR MAKING 1440 STOPS.
COMMON SHOE AFTER 40 DAYS WEAR MAKING 1440 STOPS.
SECTIONAL VIEW OF CONGDON SHOE.
PAT. MAR. 21. 1876.
PERSPECTIVE VIEW OF CONGDON SHOE

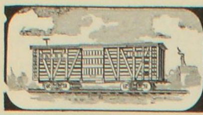
This shoe, while being more effecttive, in that greater uniformity of friction can be obtained when applied to the wheels of a train in motion without stopping the revolution of any till the train is at rest, exceeds in life, or the durability of the Shoe itself, that of the cast-iron shoe by over seventy-five per cent.

Its durability, together with cheapness and simplicity of construction, recommend it in preference to any other in use

All communications should be addressed to

THE CONGDON
BRAKE SHOE CO.,
Commercial Bank Building,
ROOM 10, - - CHICAGO.
Or Ramapo Wheel & Foundry Co.,
Ramapo, N. Y.
GEO. McDOUGALL,
Three Rivers, P. Q., Canada.

B. F. MASTEN, PREST. C. E. GORE, SUPT.
LA-FAYETTE CAR-WORKS
LA FAYETTE, IND.
FREIGHT, CABOOSE & REFRIGERATOR CARS. PUSH CARS HAND &
OF ALL KINDS
WAREHOUSE TRUCKS & BAGGAGE BARROWS. CAR WHEELS & CASTINGS

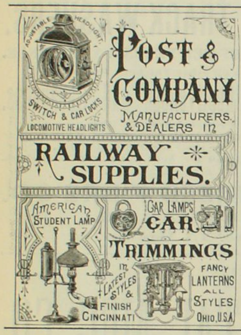


TIFFANY SUMMER & WINTER CAR.
LA FAYETTE CAR WORKS
REFRIGERATOR LINE.

NATIONAL EXPOSITION OF RAILWAY APPLIANCES. CHICAGO 1883
SILVER MEDAL
AWARDED TO
E. L. BUSHNEL
Po'keepsie, N. Y.
FOR THE BEST
SEAT, BACK AND
BERTH SPRINGS

Po'keepsie N. Y
No. 320 Wabash Avenue, Chicago, Ill.

Patentee and manufacturer of Springs for Plain and Double Spring Edged Seats, Backs, Berths and Mattresses. The Only Springs Awarded a Prize at the National Exposition. Adopted and used by nearly all the leading railroads and car-builders in the United States and Canada. Also for beds throughout the country. Circulars, reference and samples free.


ADJUSTABLE HEADLIGHT.
POST & COMPANY
SWITCH & CAR LOCKS
LOCOMOTIVE HEADLIGHTS
MANUFACTURERS & DEALERS IN
RAILWAY SUPPLIES.
AMERICAN STUDENT LAMP
CAR LAMPS
CAR TRIMMINGS
IN LATEST STYLES & FINISH
FANCY LANTERNS ALL STYLES
CINCINNATI OHIO, U.S.A.

Wrecking and Construction Car.

All the main features, such as leveling car, turn table, self-adjustable step for vertical post, twenty feet hoist, working over embankments, swinging load—car body or more—direct on to freight car, hinged jacks, direct grapples to rail, and other important features, all perfected and patented by Jewett, foreman of a wrecking gang for many years.

For further information apply to the builder,

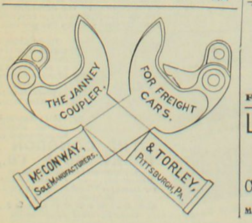
HARRISON LORING,
Boston, Mass.

NOTICE.—To build an efficient wrecking car, many of the main features of this car would have to be incorporated into it, which would be an infringement of my patents. Such cars are being built by the undersigned (having special tools for the work) at very reasonable prices, and no charge made for the patent rights, which would have to be paid for by the user if made by an unauthorized person.

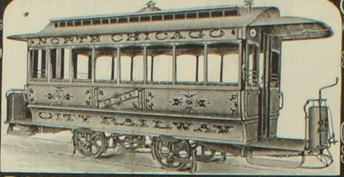
HARRISON LORING.

JOHN T. LEWIS & BROS.
WARRANTED
PURE
WHITE
LEAD.
PHILADA.
TRADE MARK.
No. 231 South Front Street.

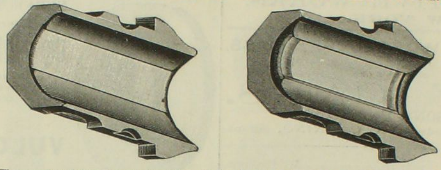
Manufacturers of White Lead, Red Lead, Litharge, Orange Mineral, Linseed Oil and Painters' Colors.



JOHN STEPHENSON COMPANY LIMITED NEW YORK.
BEST MATERIALS MINIMUM PRICES ORDERS QUICKLY FILLED
CAREFUL ATTENTION TO SHIPMENTS ALL CLIMATES SUITED
TRAMWAY CARS OF EVERY DESCRIPTION.
LIGHT, ELEGANT, DURABLE.



TUBAL SMELTING WORKS,
760 & 762 SOUTH BROAD ST., PHILADELPHIA.
PAUL S. REEVES' IMPROVED LEAD-LINED CAR JOURNAL.



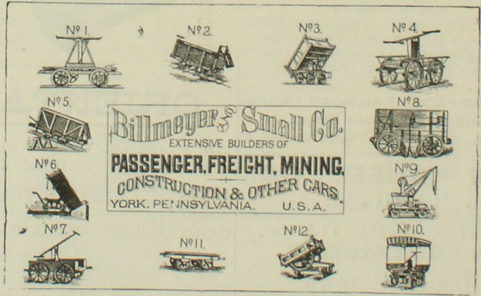
The most satisfactory combination of hard and soft metal yet offered to Railroads and Car-Builders. **They have given entire satisfaction wherever used.** Send for sample set; and, if not satisfactory, no pay will be asked.

GEO. WESTINGHOUSE, JR., President
A. T. ROWAND, Secretary.
ROBERT PITCAIRN, Treasurer.
W. T. TAGGART, Superintendent.
C. H. JACKSON, Vice-President.
ELMER L. WHITE, Asst. Secretary.

THE STANDARD
CAR HEATING AND VENTILATING COMPANY,
MANUFACTURERS OF
STEAM HEATING AND VENTILATING APPARATUS
FOR
RAILWAY CARS.

Now in use on several of the most important Railway Lines of the Country. Full information and catalogue upon application.

OFFICE and WORKS, Duquesne Way and Garrison Alley, PITTSBURGH, PA.


Nº 1.
Nº 2.
Nº 3.
Nº 4.
Nº 5.
Nº 8.
Nº 6.
Nº 9.
Nº 7.
Nº 11.
Nº 12.
Nº 10.

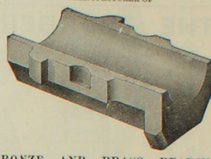
Billmeyer & Small Co.
EXTENSIVE BUILDERS OF
PASSENGER, FREIGHT, MINING,
CONSTRUCTION & OTHER CARS
YORK, PENNSYLVANIA. U.S.A.

ERIE CAR WORKS [LIMITED].
ERIE, PA.
Capacity 16 Cars Per Day.
FREIGHT CARS OF BEST MATERIAL, AND CONSTRUCTION A SPECIALTY

LITCHFIELD CAR AND MACHINE COMPANY,
LITCHFIELD, ILLINOIS,
Manufacturers of all kinds of Passenger and Freight Equipment, both Wide and Narrow Gauge.
CAR WHEELS A SPECIALTY IN THE MACHINERY DEPARTMENT.

Especial attention is given to furnishing Hoisting Engines, Pit Cars, Dumps, etc., etc., for Coal Mines, as well as building Stationary Engines and Boilers, and General Brass and Sheet-Iron Work.

AMERICAN BRONZE WORKS,
J. W. HEISER, Proprietor,
MANUFACTURER OF



BRONZE AND BRASS BEARINGS.
Car and Locomotive Work a Specialty.
23 Columbus Street, Cleveland, Ohio.

PEUGEOT FRÈRES'
"LION" BRAND OF BAND SAWS
BEST IN QUALITY AND CHEAPEST.

Manufacture all kinds of Saws for Metal and Wood. Also, High Grades of Sheet Steel, suitable for all purposes.

Correspondence solicited.

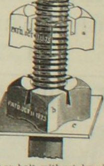
McCOY & SANDERS,
SOLE AGENTS,
26 WARREN STREET, NEW YORK.

THE STANDARD LUBRICATING OIL
OF AMERICA
FOR RAILROADS.
GALENA
ENGINE, COACH AND CAR OIL.
Gravity, 26°, 27°, 28°, 29°. Cold Test, 10° to 15° below zero.

No freezing in coldest weather, and entire freedom from hot journals at any time, as its exclusive use upon a majority of the leading railroads has demonstrated.

Showing Better Results than any Oil Extant
REFERENCES FURNISHED ON APPLICATION.
GALENA OIL WORKS (Limited),
FRANKLIN, PA

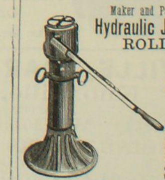
Atwood Safety Nut Co.,
Springfield, Mass.
J. W. LARABEE,
Treasurer.



a. ATWOOD NUT on bolt without bearing on base slots open.
b. ATWOOD NUT turned to bearing *c* partially closing the slots and grasping the bolt.

RICHARD DUDGEON,
No. 24 Columbia St., New York.
Maker and Patentee of IMPROVED
Hydraulic Jacks, Punches
ROLLER-TUBE
EXPANDERS,
AND
DIRECT ACTING
Steam
Hammers.

JACKS FOR PRESSING ON CAR-WHEELS OR CRANK PINS MADE TO ORDER. Communications by letter will receive prompt attention.



HYDROSTATIC
R. R. CAR JACK.

By this jack cars can be raised or lowered at any desired speed. Will send on 30 days' trial to any railroad.

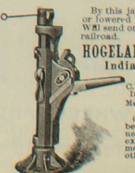
HOGELAND & ANDERSON
Indianapolis, Ind.

C. I., St. L. & C. Ry. Co.,
Indianapolis, Sept. 2, '84.

Messrs. HOGELAND & ANDERSON.

Gentlemen: We have been using your jacks for nearly three months, with excellent results. Our men prefer them to any other by long odds.

J. F. RICHARDS,
Foreman.



F. W. THAYER. A. S. HOWELL.

THAYER, HOWELL & CO.,

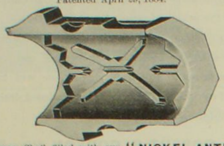
SOLE MANUFACTURERS OF OUR OWN

PATENT RAILROAD JOURNAL BEARINGS,

"SUPERIOR" BRONZE AND "ANTI-FRICTION" METALS.

418 to 428 FOWLER STREET, - - - - - - - - MILWAUKEE, WIS.

Patented April 29, 1884.



This Bronze Shell, filled with our **"NICKEL ANTI-FRICTION,"** is producing immense mileage on all railroads now using, among them the **Chicago, Milwaukee & St Paul Railway,** who have adopted over all others, and to whom we are pleased to refer by permission.

Our "Anti-Friction" Metal is **UNSURPASSED** as a ubricator, under any pressure, slow or greatest speed.

OUR "SUPERIOR BRONZE" we warrant unsurpassed by that of any other so-called Bronze or composition Metal for bearings and miscellaneous purposes. We will furnish this metal in Castings or Ingot, as may be desired, and respectfully solicit your correspondence. We have as large a Smelting Capacity as any Foundry in Brass and Bronze in the country, and are able to **FILL ALL ORDERS PROMPTLY.**

Please request our prices (f. o. b. anywhere in United States) on Bearings, Brass and Bronze Work, Anti-Friction Metal in Pigs, etc., etc.

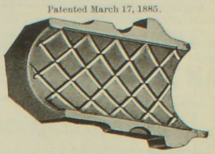
Bearings for Tests Furnished Gratis.

No Charge Made for Patterns.

WE REFER TO WESTERN RAILROAD ASSOCIATION AS TO VALIDITY OF PATENTS.

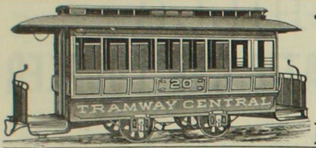
Car-Builders will find it Advantageous to Communicate with Us.

Patented March 17, 1885.



This is a **Solid Bored Bearing,** containing grooves one-eighth inch deep for free distribution of oil in starting, thereby preventing many hot journals.

The above, when made from our "Superior" Bronze, and lined with our "Nickel Anti-Friction," produces a bearing which recent severe tests have convinced our customers to be the best yet, as a prominent Railroad Manager says, "The 'gilt edged' Bearing of America, yielding in its nature and **not wearing the journal, yet resisting self-wear** better than any other Bearing I ever saw."

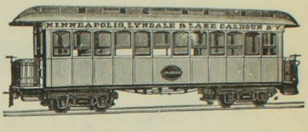


J. G. BRILL & CO.,

PHILADELPHIA

BUILDERS OF

RAILWAY AND TRAMWAY CARS.


MINNEAPOLIS, LYNDALE & LAKE CALHOUN R'Y.

FRANK J. HECKER, President. C. L. FREER, Secretary and Treasurer.

PENINSULAR CAR COMPANY.

NEW WORKS AND FOUNDRIES. MODERN TOOLS AND MACHINERY.

FREIGHT CARS OF ALL CLASSES. CAR WHEELS AND CASTINGS.

CAPACITY, - - - - - - - - - - 30 CARS PER DAY.

DETROIT, MICHIGAN.

A. HEGEWISCH, President.
THOS. F. B. Parker, Secy. } New York, N. Y.

C. BENN, Treasurer.
W. H. CHADDOCK, Genl. Agt., } Chicago, Ill.

THE UNITED STATES ROLLING STOCK COMPANY,

General Offices, 35 Wall St., N. Y.; Works, Chicago, Ill., and Urbana, Ohio,

Offers for lease to Railroads, Freight Lines, Mining Companies and others, Locomotive Engines, Box, Stock, Gondola, Dump, Flat and Refrigerator Cars,

And is Prepared to Build for LEASE and on Contract for CASH, or under the CAR-TRUST SYSTEM, such ROLLING STOCK as may be Required.

MICHIGAN CAR COMPANY,

DETROIT, MICHIGAN,

MANUFACTURERS OF

RAILROAD FREIGHT CARS, BEEF AND DAIRY CARS.

JAMES McMILLAN, President.
HUGH McMILLAN, V. Pres. and Gen. Manager.
JAMES McGREGOR, General Superintendent.

H. W. DYAR, Assistant Man.
W. K. ANDERSON Treasurer.
JOSEPH TAYLOR Secretary.

Car Wheels, Castings, Car Axles, Forgings, Links and Pins.

FULTON IRON AND ENGINE WORKS,

DETROIT, MICHIGAN.

Bronze Journal Metal for Freight Cars.

Hopkins Lead-Lined Bearings.

CLAMER'S AJAX JOURNAL METAL.

JAMES McMILLAN, Prest. I. DeGRAFF, Mgr. M. T. CONKLIN, Treas. HUGH McMILLAN, Secy.

CLEVELAND, COLUMBUS, CINCINNATI & INDIANAPOLIS RAILWAY.

Evening trains leave CLEVELAND daily with Rotunda Sleeping Cars for COLUMBUS, CINCINNATI, INDIANAPOLIS, LOUISVILLE, TERRE HAUTE, EVANSVILLE, ST. LOUIS and all points West and South. Morning trains leave Daily, except Sunday, with Through Palace Coaches, for COLUMBUS, CINCINNATI, INDIANAPOLIS, LOUISVILLE, and ST. LOUIS without change. This is the only line making direct communication with all the Principal Trunk Lines of the East for NASHVILLE, MEMPHIS, NEW ORLEANS and all points in Texas, either by way of LOUISVILLE or ST. LOUIS. Direct connection at ST. LOUIS for all Railway Towns in Kansas, Nebraska and Colorado.

Equipment Comprises all Valuable Improvements.

THE BEST ROAD-BED AND SAFEST ROAD IN THE WEST.

E. B. THOMAS, General Manager. A. J. SMITH, General Ticket Agent.

CLEVELAND MALLEABLE IRON CO.,

MANUFACTURERS OF

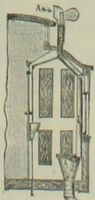
REFINED MALLEABLE IRON CASTINGS

TO ORDER.

GENERAL RAILROAD AND CAR WORK A SPECIALTY.

Awarded Bronze Medal at National Exhibition of Railway Appliances, Chicago, 1883, for best Piece Malleable Iron Casting.

CLEVELAND, OHIO.



THE DETROIT VENTILATOR,

Which carries a powerful Current of Air directly through the Urinal and Hopper on Passenger Cars and Steamboat Closets while in motion or standing, hence doing away with all mephitic odors, to the health and comfort of their patrons.

McGOVERN & WILLSON,

PROPRIETORS,

185 Thirteenth Street, - - 64 Baker Street,

DETROIT, MICH.

OCEANIC Steam Laundry COMPANY.

RAILROAD,
STEAMSHIP, HOTEL AND
RESTAURANT WORK.

630 GRAND AND 32 to 38 BISHOP STREETS,

CHAS. ZUST, Manager. JERSEY CITY, N. J. TELEPHONE CALL 214.

THE EGAN COMPANY,

(Successors to the Cordesman & Egan Company),

MANUFACTURERS OF THE

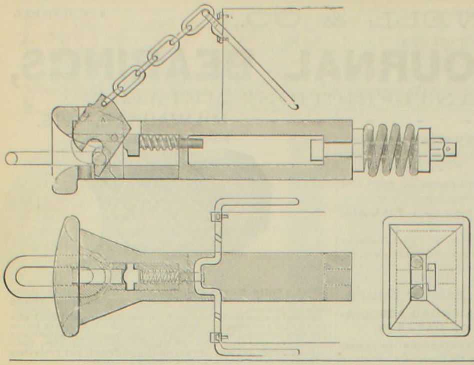
Most Improved and Patented WOOD-WORKING MACHINERY,

Nos. 235 to 255 WEST FRONT STREET, CINCINNATI, O., U. S. A.

BOUND VOLUMES OF THE NATIONAL CAR-BUILDER

FOR 1880, 1881, 1882, 1883 AND 1884.

Price, - - - - - - - $3.00 Each.



THE CURTIS & WOOD AUTOMATIC COUPLER COMPANY,

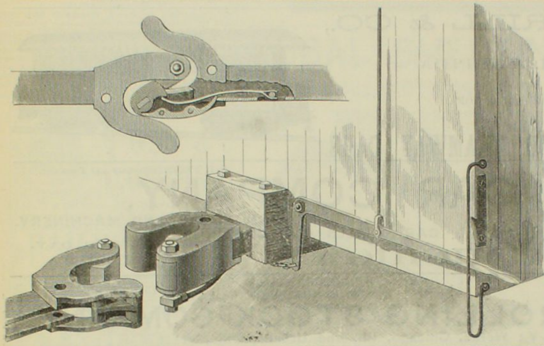
140 S. FOURTH STREET, PHILADELPHIA, PA.

The most complete, simple, durable and effective Automatic Freight Car Coupler. It is in actual and satisfactory use on some of the principal railroads. Automatic and certain, it insures absolute safety in coupling and uncoupling, and makes it unnecessary for trainmen to go between cars. It costs but little more than the ordinary link-and-pin coupling. It will couple to any draw-head, and can be adjusted to any draft rigging, or will take the place of any draw-bar now in use. We will equip cars for trial by any railroad desirous of testing the coupler on its merits. For full information, address

L. L. BUSH, President. **ROBERT R. CORSON, Vice-Pres.**

ADDRESS ALL BUSINESS LETTERS TO

WILLIAM H. CRESSON, Secretary.



HILL'S AUTOMATIC CAR COUPLER

Couples in a "vertical plane"; is simple in construction, inexpensive, strong and durable. It couples surely, at speed or slow, on a tangent or curve, on cars which vary 4 in. or less in height, and is easily uncoupled from the top of either car while in motion. It can be instantly set so as **not** *to couple. It couples, and draws in a straight line, with an ordinary link-and-pin draw-bar. Address*

C. H. BLODGETT,

BURLINGTON, VT.

THE McKEEN SAFETY COUPLER

Was subjected to most severe tests at Buffalo, N. Y., both on the straight and curved track, standing them successfully, and was recommended by the Executive Committee of the Master Car-Builders' Association.

IT IS BOTH AUTOMATIC AND SAFE.

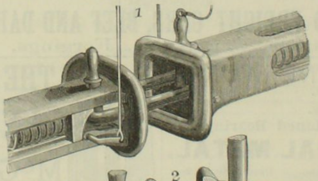
This coupler has the great advantage of being **Automatic** when applied to itself, a perfect **Safety Coupler** in coupling with any Drawheads now in general use, there being no necessity for going between the cars to couple or uncouple.

It can be coupled or uncoupled from the top or platform of the car while in motion.

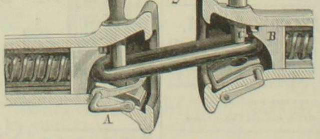
The construction of the Drawhead being so similar to the old Drawhead in general use, it has all the advantages of that, with its absolutely safety qualities, at a slight additional expense.

It saves the bending and breaking of Links and loss of Pins.

1



2



The Improvements can be put in old cast or wrought Drawheads with a hollow back or on the Locomotive at trifling expense.

It gives all the slack of the present system, and any length of Link can be used.

It is thoroughly protected by four patents.

It is in use on the L. V. R. R., in Cast Steel Drawheads; also in their Wrought Drawheads; and they have put on a large number in Cast Iron.

It has met the approval of H. S. GOODWIN, Gen'l Sup't, and JNO. S. LENTZ, M. C. B., and I refer by permission to them as to its practical and economic features, and as to doing what I claim.

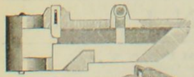
Pairs of these Couplers will be sent to railroad companies wishing to give them a trial, ready fitted up to put on, free of charge, by application to the undersigned.

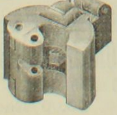
T. L. McKEEN, EASTON, PA.

THE THURMOND

Automatic Car Coupler,

FOR FREIGHT AND PASSENGER CARS.

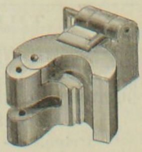




This Coupler is of the "**Vertical Hook Type,**" and has no springs. Its means of Locking is Gravity.

Guaranteed to couple on the sharpest curves to cars of different heights and styles.

It requires no fitting—ready from the molds to apply to cars. Draw-bar weighs from 80 to 120 pounds in malleable iron, and from 150 to 180 pounds in cast iron. It is Automatic in locking and unlocking, and is always ready for use. Cheap, safe and reliable. Address



W. H. THURMOND, Forsyth, Monroe County, Ga.

THE AJAX METAL COMPANY

Trade Mark.

CLAIM FOR "AJAX METAL"

1st : 25 to 50 per cent. more mileage.

2d : 33⅓ per cent. greater tensile strength and 100 per cent. greater crushing strength.

3d : 20 per cent. less friction and wear upon journal.

4th : 85 per cent. less hot journals than any known alloy

5th : Costs no more than copper and tin or gun metal.

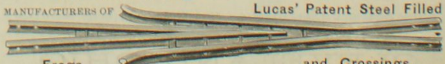
Castings made to order as per patterns received.

OFFICE AND WORKS; 2040 NORTH 10th STREET,
PHILADELPHIA, PA.

J. G. HENDRICKSON, J. F. CLAMER, } Copartners.

Cleveland Frog and Crossing Works.

MANUFACTURERS OF Lucas' Patent Steel Filled

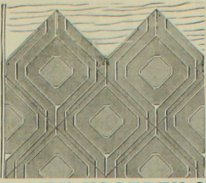


Frogs and Crossings,

Also of all kinds of Split Switches, Switch Stands, Tie Bars and Track Supplies in General.

GEO. C. LUCAS, Supt. **BOWLER & CO., 14 Winter Street, Cleveland, O.**

LOWE'S METALLIC PAINT CO.,
CHATTANOOGA, TENNESSEE.
XENOPHON WHEELER, Prest. GEO. M. CHAPMAN, Treas. and Manager.
Original Manufacturers of the Well Known
DRY METALLIC PAINT
From Red Fossiliferous Iron Ore.
SUPERIOR IN PURITY AND STRENGTH, UNEQUALED IN UNIFORMITY OF COLOR AND IN FINISH, AND REQUIRING TWENTY-FIVE PER CENT. LESS OIL THAN ANY OTHER PAINT.
The Paint for Factories, Cars, Bridges, Roofing, and all Structures and Materials Exposed to the Weather.
WRITE FOR QUOTATIONS.



BEST ROOF
In the World is the Montross Patent
METAL SHINGLES
Cheap, Durable, Handsome, Fireproof.
Absolutely Water-tight.
Proof against Storms, Snow and Ice.
Can be put on by anybody.
Adapted for all classes of Buildings.
Send for Circulars and Price Lists, free.
E. VAN NOORDEN & CO., BOSTON, MASS.

Index to Advertisements in the National Car-Builder.

Air Brakes: PAGE.
The American Brake Co., St. Louis, Mo.(cover) 1
Westinghouse Air Brake Co., Pittsburgh, Pa... (cover) 1

Axles:
Lang, W. Baily, New York and Boston xxii
Midvale Steel Co., Philadelphia, Pa iii
New Albany Steam Forge, New Albany, Ind... xvi
Patent Shaft & Axletree Co., N. Y. (cover) 4

Balance Slide Valves:
Richardson, F. W., Troy, N. Y (cover) 4

Bell Cord and Couplings:
Wellington, Henry W., Boston, Mass ii

Boudoir Cars:
Mann Boudoir Car Co., New York, N. Y xi

Boiler Plate:
Ewald Iron Co., St. Louis Mo xii
Shoenberger & Co., Pittsburgh, Pa x

Bolt Cutters:
Howard Iron Works, Buffalo, N. Y ix

Cars:
Billmeyer & Small Co., York, Pa vi
Bradley Car Works, Worcester, Mass v
Brill, J. G. & Co., Philadelphia, Pa vii
Carlisle Mfg. Co., Carlisle, Pa iii
Erie Car Works (Limited) vi
Ensign Manufacturing Co., Huntington, W. Va. iii
Harlan & Hollingsworth Co., Wilmington, Del. iii
Harrisburg Car Mfg. Co., Harrisburg, Pa ix
La Fayette Car Works, La Fayette, Ind vi
Lehigh Car Mfg. Co., Stemton, Pa iii
Litchfield Car and Machine Co., Litchfield, Ill. vi
Loring, Harrison, Boston, Mass vi
Michigan Car Co., Detroit, Mich vii
Pardee Car Works (Limited), Watsontown, Pa iii
Peninsular Car Works, Detroit, Mich vii
Pennock Bros., Minerva, Ohio v
Roanoke Machine Works, Roanoke, Va ii
Southern Car Works, Knoxville, Tenn iii
Stephenson, The John Co. (Limited), N. Y vi
Tiffany Refrigerator Car Co., Chicago, Ill v
U. S. Rolling Stock Co., New York, N. Y vii
Wason Manufacturing Co., Springfield, Mass. iii

Car Brake Shoes:
Congdon Brake Shoe Co., Chicago, Ill v

Car Couplings:
Ames Car Coup. Co., Philadelphia, Pa. (cover.) 2
Cowell Platform & Coupling Co., Cleveland, O. xiv
Curtis & Wood, Philadelphia, Pa viii
Hill's Automatic Car Coupler, Burlington, Vt. viii
McConway, & Torley, Pittsburgh, Pa vi
McKeen Safety Coupler, Easton, Pa viii
Thurmond Auto. Car Coupler, Forsyth, Ga viii
U. S. Car Coup. Co., Boston, Mass (cover) 4

Car Hardware:
Post & Co., Cincinnati, Ohio vi
Union Brass Manufacturing Co., Chicago, Ill. xviii

Car Heaters:
Baker Heater Co., New York (cover) 3
Spear, James, Philadelphia, Pa xiii
Standard Car Heat. & Ven. Co., Pittsburgh, Pa. vi

Car Jacks:
Hogeland & Anderson, Indianapolis, Ind vi

Car Movers:
Bannon, J. H., Chicago, Ill (cover) 4

Car Pushers:
Penfield Block Co., Lockport, N. Y ix

Car Seats:
Bunkin, Geo. & Co., Philadelphia, Pa (cover) 1
Gardner, Holmes & Co., New York, N. Y xxii
Hale & Kilburn Mfg. Co., Phila., Pa xvi

Car Seat Springs:
Bushnell, E. L., Poughkeepsie, N. Y vi

Car Springs:
Andrews & Clooney, New York, N. Y. (cover) 3
Cliff & Righter Co., New York, N. Y (cover) 1
Davis, A. B., Car Spring Co., Phil., Pa. (cover) 3
Diamond State Car Spring Co., Wilmington, Del. (cover) 3
French, A., Spring Co., Pittsburgh, Pa 1
Jeffries, J. & Son, Philadelphia, Pa (cover) 3
National Car Spring Co., New York, N. Y xvi
Pickering Spring Co. (Limited), Phil., Pa. (cover) 3
Scott, Chas., Philadelphia, Pa (cover) 1
Vose, Richard, New York, N. Y. (cover) 1

Car Wheels:
Allen Paper Car-Wheel Co., New York, N. Y iv
Andrews & Clooney, New York, N. Y. (cover) 3
Baltimore Car Wheel Co., Baltimore, Md v
Bass Foundry & Machine Works, Ft. Wayne, Ind. iii
Bowler & Co., Cleveland, O ii
Brooks Locomotive Works, Dunkirk, N. Y v
Cayuta Wheel & Foundry Co., Sayre, Pa iii
Davenport & Fairbairn, Erie, Pa v
Detroit Car Wheel Co., Detroit, Mich vii
Dickson Mfg. Co., Scranton, Pa iv
Ellis, W. R., New York & Boston (cover) 4
Griffin Car Wheel Co., Detroit, Mich. (cover) 4
Griffin, Thomas F. & Sons, Buffalo, N. Y. (cover) 4
Griffin & Wells Foundry Co., Chi., Ill. (cover) 4
Jersey City Wheel Foundry & Mach. Works, Jersey City, N. J iv
Knoxville Car Wheel Co., Knoxville, Tenn v
Lobdell Car-Wheel Co., Wilmington, Del iii
Maher & Brayton, Cleveland, O v
Mowry Car Wheel Works, Cincinnati, O iii
Paige Car Wheel Co., Cleveland, Ohio iv
Ramapo Wheel & Foundry Co., Ramapo, N. Y. v
Roanoke Machine Works, Roanoke, Va ii
Rochester Car Wheel W'ks, Roch., N. Y. (cov) 4
Taylor Iron Works, High Bridge, N. J iii
Wason Manufacturing Co., Springfield, Mass iii
Whitney, A. & Sons, Philadelphia, Pa iii

Chains:
Box, Alfred & Co., Philadelphia, Pa xiv

Chilled Car Wheel Grinding:
Chilled Car Wheel Grinding Co., Carson, Nev. iv

Clamps:
Armstrong, F., Bridgeport, Ct. ii

Corrugated Sheet Iron:
Cincinnati Corrugating Co., Cincinnati, O. (cover) 2

Draughtsman's Materials:
McAllister, Oswald, Philadelphia, Pa (cover) 4

Draw-Bars:
Safford, J. B., Buffalo, N. Y ii

Engines:
Cummer Engine Co., Cleveland, O ii

Exhaust Fan:
Buffalo Forge Co., Buffalo, N. Y (cover) 2

Fire Box Steel:
Schoenberger & Co., Pittsburgh, Pa x

Flexible Shafts:
Stow Flexible Shaft Co. (Lim.), Phil., Pa. xviii

For Sale—Street Railway Cars:
People's Pass. Ry. Co., Philadelphia, Pa xiv

For Sale—Car Works:
Anniston, Ala (cover) 1

Forges:
Buffalo Forge Co., Buffalo, N. Y (cover) 2
Cleveland City Forge & Iron Co., Cleveland, O. x
Empire Portable Forge Co., Cohoes, N. Y ii

Frogs & Crossings:
Cleveland Frog & Crossing W'ks, Cleveland, O. viii
Union Switch & Signal Co., Pitts., Pa. (cover). 1

Hand-Car:
Sheffield Velocipede, Peabody, H. W., & Co., Boston, Mass xxii

Hydraulic Jacks:
Dudgeon, R., New York, N. Y vi
Watson & Stillman, New York, N. Y xxii

Injectors:
Nathan Mfg. Co., New York, N. Y... (cover) 2
Sellers, Wm. & Co., Philadelphia, Pa (cover) 2

Interlocking Switches:
Union Switch & Signal Co., Pittsburgh, Pa. (cov.) 1

Journal Bearings:
Ajax Metal Co., Philadelphia, Pa viii
American Bronze Works, Cleveland, O vi
Damascus Bronze Co., Pittsburg, Pa xii
Fulton Iron & Engine Works, Detroit, Mich vii
Meneely, George R. & Co., W. Troy, N. Y x
Oriental Metal Co., Boston, Mass v
Phosphor-Bronze Smelting Co. (Limited), Philadelphia, Pa xvii
Reeves, Paul S., Philadelphia, Pa vi
Ryan, J. J. & Co., Chicago, Ill (cover) 1
Thayer, Howell & Co., Milwaukee, Wis vii

Journal Box:
Raoul Journal Box Co., Ramapo, N. Y x

Journal Box Lids:
Hewitt Box Lid Cover Co., Chicago, Ill ii

Laundry:
Oceanic Steam Laundry Co., Jersey City, N. J. vii

Locomotives:
Pittsburgh Loco. & Car W'ks., Pittsburgh, Pa. xii
Porter, H. K. & Co., Pittsburgh, Pa xii
Rhode Island Loco. Wks., Providence, R. I xii
Rogers Loco. & Mach. W'ks, Paterson, N. J xii
Schenectady Locomotive Works, N. Y xii

Lubricants:
Seibert Cylinder Oil Cup Co., Boston, Mass xii
Smith, E. A. & Co., Pittsburgh, Pa iii
Urquhart, John S., New York, N. Y ii

Manufacturers' Agents:
Carson, Woods & Co., Sidney, N. S. Wales (cover) 1

Machinists' Tools:
Bement, Miles & Co., Phila., Pa (cover) 2
Betts Machine Co., Wilmington, Del (cover) 2
Box, Alfred & Co., Philadelphia, Pa xiv
Brown & Sharpe, Providence, R. I (cover) 2
Flanders, L. B., Machine Works (Pedrick & Ayer), Philadelphia, Pa (cover) 4
Forsaith, S. C., Mach. Co., Manchester, N. H. ii
Hilles & Jones, Wilmington, Del (cover) 2
Lodge, Barker, Cincinnati, Ohio (cover) 4
Niles Tool Works, Hamilton, O. (cover) 4
Pratt & Whitney Co., Hartford, Conn xviii
Sellers, Wm. & Co., Philadelphia, Pa. (cover) 2
Shimer, Samuel J., Milton, Pa ii
Stow Flex. Shaft Co. (Limited), Phila., Pa xviii

Mahogany, Fancy Woods & Veneers:
Albro Co., The E. D., Cincinnati, O i
Graham, John R., New York, N. Y (cover) 4
Uptegrove, Wm. E. & Bro., New York, N. Y. (cover) 4

Malleable Iron:
Cleveland Malleable Iron Co vii

Matcher Heads:
Shimer, Samuel J., Milton, Pa ii

Nuts:
R. I. Tool Co., Providence, R. I xi

Nut-Locks:
Atwood Safety Nut Co., Springfield, Mass vi
Prosser, Thos. & Sons, N. Y xviii

Oils:
Galena Oil Works (Limited), Franklin, Pa vi
Signal Oil Works, Franklin, Pa ix
Stuart, D. A. & Co., Chicago, Ill xvi

Oil-Box Covers:
Vulcanized Fibre Co., Wilmington, Del v

Paints:
Devoe, F. W. & Co., New York, N. Y x
Iron Clad Paint Co., Cleveland, O x
Lowe's Metallic Paint Co., Chattanooga, Tenn. ix
Raynolds, C. T. & Co., New York, N. Y xiv
Sherwin, Williams & Co., Cleveland, O xi
Smith, Edward & Co., New York, N. Y x

Platform and Couplings:
Cowell Platform & Coupling Co., Cleveland, O. xiv

Portable Drills:
Stow Flex. Shaft Co. (limited), Phila., Pa. xviii

Power Hammers:
Forsaith, S. C., Mach. Co., Manchester, N. H. xxii
Long & Allstatter Co., Hamilton, O xvi

Power Punches, Shears and Hammers:
The Long & Allstatter Co., Hamilton, O xvi

Publications:
Wiley, John & Sons, New York, N. Y i

Railways:
C., C., C. & I. R. R vii

Railway Supplies:
Adams & Westlake, Chicago, Ill xviii
Ellis, W. R., New York and Boston (cover) 4
McCoy & Sanders, New York, N. Y vi
Post & Co., Cincinnati, Ohio vi
Union Brass Works, Chicago, Ill xviii
Williamson & Cassedy, Philadelphia, Pa. xxii

Railway Equipment:
Patten, Jas. T., New York, N. Y xi

Rail Fastenings:
Sellers, Morris & Co., Chicago, Ill i

Refrigerator Cars:
Tiffany Refrigerator Car Co., Chicago, Ill. v

Roofing:
Cincinnati Corrugating Co., Cincinnati, O. (cover) 2
Van Noorden & Co., E., Boston, Mass ix

Rubber Goods:
Brook, Jas. F., Trenton, N. J ix

Safety Valves:
Ashton Valve Co., Boston, Mass xii
Consolidated Safety Valve Co., N. Y i

Sheet-Iron:
Wood, W. D. & Co. (Limited), Pittsburgh, Pa xii

Signals
Ry. Cab Elect. Signal Co., New York, N. Y xx
Union Switch & Signal Co., Pittsb'gh, Pa. (cover) 1

Skylights:
Van Noorden & Co., E., Boston, Mass ix

Stay-Bolt Iron:
Lang, W. Bailey, New York, N. Y x

Steel:
Midvale Steel Co., Philadelphia, Pa iii
Standard Steel Works, Philadelphia, Pa vii

Steel Castings:
Chester Steel Castings Co., Phila., Pa. iii
Eureka Cast-Steel Co., Philadelphia, Pa. xxii

Steel Tires:
Midvale Steel Co., Philadelphia, Pa iii
Standard Steel Works, Philadelphia, Pa iii

Switch Stands:
Union Switch & Signal Co., Pittsburgh, Pa. (cover) 1

Switches:
Union Switch & Signal Co., Pittsburgh, Pa. (cover) 1

Tackle Blocks, Trucks and Baggage Barrows:
Penfield Block Co., Lockport, N. Y ix

Track Washers:
Vulcanized Fiber Co., Wilmington, Del v

Trucks:
Automatic Truck Works, Midland Park, N. J i

Twist Drills:
Cleveland Twist Drill Co., Cleveland, O xvi
Morse Twist Drill and Machine Co., New Bedford, Mass ii

Varnishes:
Babcock, John & Co., Boston, Mass x
Berry Brothers, Detroit, Mich xiv
Bigelow, Moses & Co., Newark, N. J x
Brooks, Clarence & Co., New York (covers) 1 & 4
Devoe, F. W. & Co., New York, N. Y x
Parrott Varnish Co., Bridgeport, Conn (cover) 4
Poillon & Staples, New York, N. Y (cover) 4
Raynolds, C. T. & Co., New York, N. Y xiv
Shipman & Bolen, Newark, N. J xi
Smith, Edw. & Co., New York, N. Y x
Stimson & Co., Boston, Mass (cover) 2
Valentine & Co., New York, N. Y x
Wheeler, Asahel, Boston, Mass xvi

Ventilators:
McGovern & Willson, Detroit, Mich vii
Standard Car Heating & Ven. Co., Pitts., Pa vi
Van Noorden & Co., E., Boston, Mass ix

Vises:
Massey, T. C., Chicago, Ill v

Wire Nails:
American Wire Nail Co., Covington, Ky xviii
Hartman Steel Co., Beaver Falls, Pa xi

White Lead:
Lewis, J. T. & Bros., Philadelphia, Pa vi

Wood-Working Machinery:
The Egan Co., Cincinnati, O vii
Fay, J. A. & Co., Cincinnati, O xx
Forsaith, S. C., Mach. Co., Manchester, N. H ii
Goodell & Waters, Philadelphia, Pa xx
Rogers, C. B. & Co., Norwich, Conn xii
Woods, S. A., Mach. Co., New York, N. Y. (cover) 2

Wrecking Cars:
Harrison, Loring vi
Industrial Works, Bay City, Mich xviii

Important to Railroad Managers and Master Mechanics.
SIBLEY'S PERFECTION VALVE OIL.
More perfect lubrication insured, and entire freedom guaranteed from corrosion of cylinders and destruction of steam joints by fatty acids.
In exclusive use on 50 railroads.
References and prices furnished upon application.
☞ Make exclusive specialty of the Manufacture of Valve and Signal Oils for Railroad use.
SIGNAL OIL WORKS,
FRANKLIN, PA.
J. C. SIBLEY, President.

PENFIELD BLOCK CO.
Pulley Blocks and Iron Sheaves.
Phosphor-Bronze Self-Lub. Sheaves
Pushers, Giant Car, $5.00 each.
Poor's Manual, 1880-81 and 82.
See p. 53.
Please write for lists, prices, etc.
LOCKPORT, N. Y.

HOWARD IRON WORKS,
BUFFALO N. Y.,
MANUFACTURERS OF
Schlenker's Automatic Revolving Die Bolt Cutter and Nut Tapping Machine
ADAPTED SPECIALLY FOR RAILROAD USES

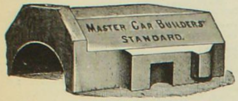
RUBBER WORKS
JAS. F. BROOK,
MANUFACTURER OF
MECHANICAL RUBBER GOODS.
OF ALL KINDS
THE NEW ENGLAND CAR SPRING
36 PARK PLACE, N.Y.
PROSPECT AVENUE, PHILA & READING, R.R.
TRENTON, N.J.
TANK, AIR-BRAKE AND ENGINE HOSE. BELTING, PACKING, SPRINGS, VALVES, Etc.

HARRISBURG
CAR MANUFACTURING CO.
MANUFACTURE
PASSENGER MAIL, BAGGAGE
BOX, GONDOLA, COAL
AND ALL OTHER KINDS OF
RAILROAD CARS;
Railroad Car Wheels and Castings, Bridge and Rolling Mill Castings, Bridge Rods, Bolts and
RAILROAD FORGINGS.

F. W. DEVOE & CO., Cor. Fulton and William Sts., New York,
COFFIN, DEVOE & CO., 176 Randolph Street, Chicago,
MANUFACTURERS OF
DRY COLORS, COACH AND CAR COLORS IN OIL AND JAPAN.
Special Colors Compounded to Match any Desired Shade.
FINE RAILWAY VARNISHES AND JAPANS FOR PASSENGER COACHES.
Also Freight Car, Caboose and Bridge Paints Ready for Use. Fine Brushes for Railroad Car and Coach Painting. All Kinds of Painters' Supplies and Artists' Materials. Mixed Paints—A Large Assortment of Desirable Shades for Inside and Outside Work.

MANUFACTURERS OF RAILWAY CAR VARNISHES.
JOHN BABCOCK & Co
NO. 2 LIBERTY SQUARE BOSTON, MASS.

GEO. R. MENEELY, } West Troy, N. Y.
T. W. GETMAN,
GEO. R. MENEELY & CO.,
WEST TROY, N. Y., AND ATLANTA, GA.,
A. B. BOSTICK, Supt., " Atlanta Brass Foundry.


MASTER CAR BUILDERS' STANDARD.

MANUFACTURERS OF
HOPKINS' PATENT SELF-FITTING JOURNAL BEARINGS
FOR RAILWAY CARS AND ENGINES.

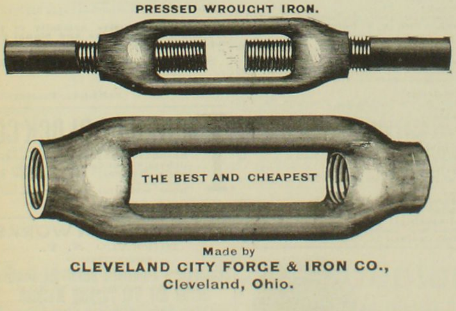
These bearings were awarded the **only** premium, a silver medal, at the National Exposition of Railway Appliances at Chicago in June, 1883. Patent pronounced valid by both Eastern and Western Railway Association. Bearings made of any required pattern, of different qualities of bronze, **BORED** out, and finished with Hopkins' Patent Self-fitting Lining, which **speedily fits itself to any journal, new or old,** effectually obviating heating, and increasing the service more than 50 per cent. over unlined brasses. The most **reliable** and economical bearings in use. Adopted by the principal Railroads of the country for passenger and freight service. Old bearings taken in exchange. No charge for pattern making, packing or delivery. Price and Pattern Lists (of over 800 patterns) furnished upon application.

TRADE VALENTINES VARNISHES MARK.
FINE COACH AND RAILWAY VARNISHES,
MANUFACTURED BY
NEW YORK, CHICAGO, **VALENTINE & COMPANY,** BOSTON, PARIS

RAILWAY VARNISHES.
MOSES BIGELOW & CO
NEWARK, N.J. EST. 1845 CHICAGO.

ESTABLISHED 1827.
RAILWAY VARNISHES, **EDWARD SMITH & CO.,** RAILWAY COLORS,
158 WILLIAM ST., NEW YORK.

PRESSED WROUGHT IRON.



Made by
CLEVELAND CITY FORGE & IRON CO.,
Cleveland, Ohio.

Boiler, Locomotive AND Smoke Stack STEELS. Quality Unsurpassed. Plates up to 100 inches in width.
FIRE BOX STEEL.
Purity, Ductility and Softness.
SHOENBERGER & CO.,
PITTSBURGH, PA.

IRON CLAD PAINT.

TRADE
IRON CLAD PAINT.
MARK.

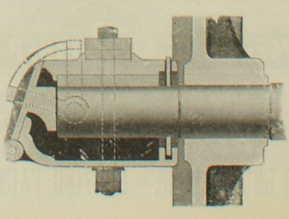
Trade-Mark Patented.

This Paint is used by nearly all the Railroads in the Country.

Used by L. S. & M. S., Wabash R'y, C., C., C. & I. R'y, C. & P. R'y, C., H. & D. R. R., Cincinnati Southern R'y, N. Y., L. E. & W. R'y. (Erie), Southern Central R. R., Canada Southern, Mobile & Ohio, N. O & Mobile, Macon & Brunswick, Penn. R. R., C., M. & St. P. R'y A. & N. R'y, R. & D. R'y Carolina Central, P., C. & St. L. R'y, P. & E. R. R., M., L., S. & W. R'y, K. & D. M. R'y, W. C. & A. R. R., M., I. & N. R'y, N. C. & St. L., N. I. & E. R. R., I. & G. N. R R., etc., etc.

IRON CLAD PAINT CO. Cleveland Ohio.

W. BAILEY LANG,
Sole Agent in the United States and Canadas for the
LOWMOOR IRON COMPANY.
Bar Iron of great strength and uniform quality
Plate Iron unequaled for Fire Boxes.
Tyres, Axles, Chain, Rivets, Angle and **T Iron** and **Forgings** of all descriptions.
STAY-BOLT IRON.
A full assortment of Bar Iron in store.
50 Beekman St., N. Y. 39 Fort Hill Square, Boston

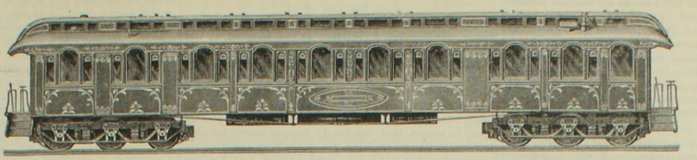


RAOUL JOURNAL BOX.

This box is designed to provide an end stop for the axle, and thereby dispense with the shoulder and collar, and at the same time not obstruct the process of packing the box. The journal may be made any desired length and diameter. The life of the axle is doubled. The expense of brasses and lubricants enormously reduced; end wear of brasses and hot boxes obviated. It is now in successful operation on trucks of engines, tenders, passenger and freight cars. For further information address

RAMAPO WHEEL & FOUNDRY COMPANY
Ramapo, N. Y.;
Columbus Iron Works Company
Columbus, Ga.

THE NATIONAL CAR-BUILDER.



DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XVI. }
NUMBER 10. }

OCTOBER, 1885.

{ SINGLE NUMBERS, TEN CENTS,
{ $1.00 PER ANNUM.

Miscellaneous Items.

The Missouri Pacific Co. have ordered 12 locomotives from the Baldwin Works, and have also ordered 600 new freight cars.

In 1875, the railway mileage of Canada averaged one mile to 900 of population; at the close of 1884 it was one mile to 520 of population.

The Chicago, Burlington & Northern road has ordered 35 passenger and 2,200 freight cars of the Pullman Co., and 35 locomotives of the Rhode Island Locomotive Works.

The Chicago, Rock Island & Pacific Railway Company are putting in a full equipment of electric lighting plant in their depot at Chicago. Arc lights will take the place of gas, which has hitherto been used.

A railroad official who is exceptionally well acquainted with the details of building and repairing cars, says that one of the most effective means of draining the treasuries of the companies is in building trucks out of square.

Continuous brakes of one kind or another have been placed upon 22,052 passenger train vehicles in Great Britain, and there are 18,460 vehicles without such brakes. The number fitted with Westinghouse brakes is 10,362.

Mr. W. H. Thurmond, of the Thurmond Automatic Car Coupler Co., of Forsyth, Ga., says that several leading railroad companies are ready to adopt his coupler as soon as it is officially and favorably passed upon by the Western Railroad Association.

The Reaser Balance Valve Manufacturing Co., of Chicago, have two locomotives equipped with their valves, and the engines are at work on the Chicago, Rock Island & Pacific road. One of them was built by the Schenectady Locomotive Works, and the other by the Rhode Island. The valve is supported by vibrating pedestals.

The following awards have been made by the jurors of the Inventions Exhibition in London: Messrs. Saxby & Farmer, a gold medal for their exhibit of safety-signaling apparatus. The Eames Vacuum Brake Co., a gold medal for their vacuum automatic continuous brake. The Phosphor Bronze Co., of Philadelphia, a gold medal for phosphor bronze alloys.

One part of the ordinary freight car which badly needs improvement is the common door. "Leaky roof, car only suitable for rough freight," is a superscription often marked on cars by freight handlers, when they find goods in a car damaged by water, In nine cases out of ten, the water that had done the damage entered the car by the openings round a badly fitted door.

A new style of car ventilator has been put for trial on the private car belonging to Mr. Clark, President of the Illinois Central Railroad. The ventilator is the invention of Mr. J. M. Finnerty, of Washington. The device is worked on the principle of induced currents, and draws the vitiated air out of the car, the amount of draft being regulated by simple means easily reached.

A Chicago inventor has patented an improvement in sleeping cars by which he proposes to obviate the jarring that sleepers receive on a rough track, by suspending the berths to springs fastened to the roof of the car. So far as we can see, rather complex mechanical means are intended to be employed to overcome a disturbing element that causes very little annoyance to ordinary travelers.

The President of the Trunk Lines, at a meeting held Sept. 22, at the office of Commissioner Fink, in New York, resolved to advance West-bound rates as follows: 1st class, 40 to 60 cents; 2d class, 30 to 50 cents; 3d class, 25 to 40 cents; 4th class, 18 to 25 cents; 5th class, 15 to 20 cents. It was also resolved to ask the Western connections to advance East-bound rates on the basis of 20 cents on grain from Chicago to New York.

We recently read a letter that a Chicago banker received from a gentleman in Paris, asking about a company that had been formed to make a patent hollow rail. He had bought stock in the company and sent his coupons for collection. The banker could not find even the name of the company in the United States, but we suspect the parties who organized the company did not try to make it known on this side of the Atlantic, as their aim evidently was to raise money beyond the seas.

A new brake-shoe, consisting of alternate layers of compressed paper and wood ¼ inch in thickness, is being tried on the Third avenue line of the New York Elevated Railroad. Shoes of this construction have been used for 13 weeks, and made a total run of 9,271 miles, against eight weeks and 6,000 miles of the ordinary metal shoe. This would equal 200,000 miles on an ordinary road, where the stops are only one-twentieth as many. There is much less wear on the wheel-tread, and it requires less time to stop the train.

In most of the reports of the August meeting of the Western Railway Club, Mr. Rogan, of the French Spring Co., is represented to have said that the Illinois Central Railroad suburban cars had been improved by being lowered. These cars are no lower than they ever have been, and Mr. Rogan only said the seats had been lowered, which added to the comfort of the passengers. It is understood that Mr. Snow felt like eating up Mr. Rogan for bearing false witness against his cars, when all the time the blame rested with the reporter.

A particularly bright Chicago daily got out an excellent article lately on the gratifying progress railroads had made during the last few years in the application of devices that increased the safety of railroad travel. A finely worked out contract was drawn between the operating of railroads to-day and what they were in the dangerous times of snake-heads and fish-joints. It was assumed that the head was fastened to the snake by means of a fish-joint, and that the combination made a metallic reptile dangerous to life and property.

Recent microscopical investigations made by Prof. P. H. Dudley into the action of steel rails and tires under ordinary conditions of service, indicate that wear takes place by minute pieces of the steel detaching themselves from the main body and falling off. Under the microscope the wearing surface resembles a badly pitted iron sheet. Where the wear is not pronounced, the small particles that eventually come out to form the pitting, are seen surrounded by irregular dark seams. These seams are nearly pure carbon. It appears that disintegration results from a rearrangement of the molecules of the metal, the carbon separating, under the conditions of wear, from the metal.

The returns made to the Board of Trade show that on the railways of Great Britain, during 1884, there were 1,134 persons killed and 4,100 injured, including passengers, employés, suicides and others. Of passengers, only 135 were killed and 1,491 injured. The proportion of passengers killed and injured during the year from all causes in the working of railways, was 1 in 5,148,088 passenger journeys killed, and 1 in 466,124 passenger journeys injured; while the proportion from causes beyond their own control was 1 in 22,419,092 journeys killed, and 1 in 804,388 journeys injured. The most frequent cause of accidents was from collisions within fixed signals at stations or sidings.

There is a locomotive engineer named J. Martin Broughton traveling round the country who appears to be a particularly smart rogue. He got employment a short time ago on a railroad in California, and after he had been at work a short time, unpaid bills from the East came pouring in upon him, and some of them were in the hands of a constable for collection. The impecunious engineer did not run away from the constable, or try to avoid him in any way. On the contrary, he courted the friendship of the minion of the law, and managed to borrow five dollars from him as a preliminary to skipping out, a proceeding which did not happen until he had sold his time and borrowed some money from confiding fellow employés.

In some Western districts traversed by the Chicago & Northwestern Railway, the water is so heavily charged with solid matter in solution, that great difficulty was experienced with injectors getting filled up with scale. Several remedies were tried without success, till some enterprising engineer had an oil-cup put on his feed pipe, enabling him to pass the quantity of black oil through the injector that he thought would be required to cut the incrustation. This simple remedy proved efficacious, and all locomotives belonging to the road running in districts where that trouble exists, are equipped with oil-cups on their feed pipes. That plan is found to be better than putting the oil cup on the steam pipe of the injector, a plan that is followed by some roads.

Mr. H. Burkhardt, general agent at Chicago for the Eureka Cast Steel Company, received a few days ago an order from a Western railroad that called for 1,900 pieces. The application of steel castings to general railroad machine work is rapidly extending. Among the pieces included in the order referred to, were cross-heads, rocker-shafts, tumbling-shafts, arms for center balance of springs, arms for tumbling-shaft, elbows for damper lever, arm for cylinder cock rigging, ratchets for throttle and for reverse lever, crank for sand box, wedge bolts, hammer dies, crown-bar thimbles and a great many other pieces for steam shovel and for car work. As a rule no finish is put upon steel castings. They are put on to the machine in the condition they come from the foundry.

The Jamestown (N. Y.) people are anxious to have the Dunkirk, Allegheny Valley & Pittsburgh road run a branch to their city, and intend raising $20,000 as an inducement. If we remember rightly, twelve or fourteen years ago, the Jamestown people were hungering and thirsting for a direct connection with Buffalo, and offered to subscribe some $100,000 toward the building of a road to make the connection. In view of this offer, the Buffalo & Jamestown Railroad Company was organized, which proceeded to build a first-class road between Buffalo and Jamestown, and after it was finished the Jamestown citizens sneaked out of their obligations and made use of a legal technicality which permitted them to repudiate an honest debt. Verily, Jamestown deserves to be left severely alone by railroad companies.

A cable system of operating a street railway has recently been constructed on Tenth avenue, New York, and it is now ready for business. The cable line extends from 125th to 186th street, a distance of about three miles, in which there are several heavy grades. The cable is made of iron wire and is 1¼ inches in diameter, is 33,100 feet long, and weighed on the reel 46 tons. To obviate the delay and inconvenience that sometimes occur on cable lines from the breaking of the cable, this company has placed two cables within the tube, one to serve as a resort in case of accident to the other. Two engines, each 350 horse-power, are used for operating the cable. The company expect to run the cars at a maximum speed of ten miles an hour. The fastest speed made on the Chicago cable roads is eight miles an hour.

The Kinzie Street Division of the Railway branch, in Chicago, of the Young Men's Christian Association, is fortunate in having a most energetic agent, Mr. William Cook, in charge of the rooms. There is already a remarkably good library in connection with the rooms, which contains an excellent selection of books treating on railroad subjects and mechanical topics interesting to the class of men that attend the rooms. There are also many antiquarian relics, engravings of railroad appliances and specimen articles of railroad equipment. They expect soon to get a working model of a locomotive built by an employé of the Chicago, Milwaukee & St. Paul Railroad. A book reception was recently held at the Association rooms, a book being the price of admission. This resulted in an addition of 80 volumes to the library.

As an illustration of the saving of labor that could be derived from the use of formers in blacksmithing operations, Mr. Davenport, Superintendent of the Erie Car Works, gave the writer particulars of what appeared a most astonishing case. They received an order for cars that had to be equipped with ladders of a most complex pattern, and four of them had to be made for each car. When they began the work of turning out eighteen cars a day, they found it kept twenty-two fires busy on ladders alone. Shortly after the work was started, the foreman, who was always encouraged to devise labor-saving appliances, designed a former, and subjected the details to the superintendent, who ordered it made. When they got this tool to work, they were able to turn out more ladders at one fire than were required for the out-put of cars.

The management of the new Chicago, Burlington & Northern Railroad, who are practically the Chicago, Burlington & Quincy managers, recently gave notice that they would make contracts for the building of 35 locomotives, 35 passenger cars, and 1,500 freight cars. Most of the locomotive and car-builders in the country put in bids, and a large attendance of builders and agents was present at the Grand Pacific Hotel, Chicago, on the day the bids were to be decided upon. The delivery of the new rolling stock is to extend over seven months. While all the bidders were anxious to obtain the contracts, there was no inclination to deliver rolling stock seven months hence at the low prices prevailing at present. The Rhode Island Locomotive Works obtained the contract for the locomotives, and the Pullman Car Company are to build all the cars.

It is said, upon what is considered good authority, that the Broadway (New York) underground railway scheme is assuming such business-like shape as to insure the building of the road. The enterprise is one of enormous magnitude, and the six and one-half miles now under contract from the Battery to Harlem, and its branches, will cost, according to surveys and estimates made and carefully supervised by Gen. George B. McClellan, from $1.200,000 to $1,400,000 per mile. A contract has been let for building the road. Many leading capitalists and business men of New York are interested in the enterprise. The entire structure will be continually lighted by electricity and the trains run by electric motors.—*Engineering News.*

The electric motor part of the announcement may possibly be a little premature.

The Jackson & Sharp Co., Wilmington, Del., has just completed an elegant private car for Mr. Austin Corbin, president of the Long Island Railroad, and the Indiana, Bloomington & Western. It is equipped with Miller and Janney platforms and Smith vacuum and Westinghouse automatic brakes; has 6-wheel trucks with Page's 33-inch wrought metal wheels and French's triple elliptic springs. The heating apparatus is W. C. Baker's self-feeding heater, manufactured by the Standard Car Heating & Ventilating Co., of Pittsburgh. The interior of the car is finished in mahogany, except the kitchen and smoking room, which are in quartered oak. The furniture of the various compartments is of the richest styles and material. Electric bells, annunciators, refrigerators, water tanks, and every possible appliance for luxury and convenience, are provided in great profusion. In these respects the car is said to be the finest one ever built.

The New York, Lake Erie & Western road has just added to its equipment three handsome buffet drawing-room sleepers. They are christened Plato, Scipio and Cicero, and will be attached to the St. Louis limited express. They are finished in cedar, with roof of maple and dome panels of the same wood bronzed. "The berth fronts," says the New York *Tribune*, "are the most striking feature of the new cars. They are of mahogany veneer, the lower half and borders being covered with gold stamped plush touched up by the painter. The effect is exceedingly rich, and with the heavy olive-green plush of the seats and their backs a fine combination is produced. In the private drawing room a special effort at rich decoration has been successfully made. The smoking room is fitted up with luxurious upholstery and panels of stamped Russia leather. The wheels are of paper, 42 inches in diameter. The company has also put on two new buffet and parlor cars, the Cataract and the City of New York."

The members of Division 111 of Locomotive Engineers have their headquarters at 4,747 State street, Chicago, where they are collecting railway appliances pertaining to locomotives, the collection being designed for the use and instruction of the members. Contributions have been sent in by a number of supply houses. During a recent visit to the hall where these appliances are being placed, we noticed a handsome book-case filled with interesting specimens, including a triple valve and an engineer's valve for the Westinghouse brake, both cut in section so as to show the working of the parts. There were also several sight-feed lubricators, rod and guide cups of various kinds, and a great variety of packing. The case also contained several valuable books, some of which had been donated and some purchased. One thing, however, which we think is more needed by locomotive engineers than any thing else in the category of appliances, is still to be furnished and that is, a good model of a locomotive's valve motion.

The driving-wheels of the first locomotive engine built in the State of New York, and the third one constructed in America, have been sent from the shops in West Albany to the Grand Central Depot in New York, for preservation as a relic. On the hub of each in yellow letters is "De Witt Clinton, first trip, August 9, 1831." Each weighs 350 pounds. In diameter they are about 5 feet. From a solid hub in the center, spokes less than an inch in diameter are set, similar to those in a wagon-wheel, but further apart, and extend to a felloe ½ inch thick and 3 inches wide. On the outer edge is a series of holes which originally held a steel flange in place. The workmanship is crude compared with that of to-day. The driving-wheels now turned out at West Albany weigh 1,900 pounds each, without the tire or more than five times as much as the wheels of the Clinton, which was the first engine that made a trip in this country, both of its predecessors breaking down. The engine was kept as a relic in the repair shops at West Albany until 10 or 12 years since, when it was broken up and the copper and brass sold to locomotive works.

Public Test of Automatic Car Couplers.

CALL FOR THE TESTS.

In accordance with the general instructions given by the Master Car-Builders' Association at the meeting at Old Point Comfort, Va., in June last, the Executive Committee on July 25, through their Secretary, Mr. M. N. Forney, issued a circular inviting inventors and proprietors of automatic freight car couplers to a public trial of their couplers, to be held at Buffalo, N. Y., beginning September 15. As the people interested in preventing the loss of life and serious injury to person that constantly happen among men engaged in coupling cars, have for years been agitating for the adoption of an automatic coupler which would enable the cars to be coupled without danger, great public interest was manifested in the approaching test, for it was expected that the Master Car-Builders' Association would be able to decide what coupler would best meet with safety the requirements of train service. The day before the trial, a multitude of persons interested in the tests had arrived in Buffalo, and all through the duration of the trials, the crowd round the headquarters of the Executive Committee was nearly as large as that which surrounds the annual conventions of the Association. In addition to master car builders and those interested in particular car couplers, there were present at the tests Railway Commissioners Ransom and McPherson, of Michigan; Major Lewis, of Kentucky; Alfred Moore, of Illinois; several railroad managers, many railroad superintendents of motive power and other influential citizens. The press of Buffalo was well represented, and published lengthy reports of the proceedings. Of the railroad press, the National Car Builder, the *Railroad Gazette*, the *Railway Review* and the *Railway World* only were represented.

REQUIREMENTS OF THE TESTS.

The Executive Committee invited all parties desiring to have automatic car couplers tried, to enter, but made the following conditions: The couplers to be attached to each end of two freight cars, preferably box cars, to be on hand in Buffalo not later than September 12. Full drawings and specifications, together with letters patent, and any opinions on the device that may have been given by the Eastern or Western Railroad Association, or by the courts, and also a statement of the numbers and initials of the cars equipped with the coupler and already in service, were to be submitted to the Executive Committee.

When the committee met at Buffalo, there were present B. K. Verbryck, President, J. W. Cloud, W. McWood, E. W. Greaves, E. B. Wall, T. D. Adams, R. C. Blackall, F. M. Wilder and John Lentz. During the first meeting, the committee arranged the following

PLAN FOR TESTING THE COUPLERS.

The cars equipped with couplers for trial will be found standing in pairs on a straight piece of track, and they will be referred to herein as equipped with couplers "a," "b," "c," "d," etc., in the order which they may happen to be. The shifter used will have a car with old-style link-pin coupler of standard height (33 inches) coupled ahead of it.

First test—The car coupled to shifter will be coupled to the car equipped with coupler "a," noting comparative safety in doing so; also noting whether they can be uncoupled without going between the cars.

Second test.—The two cars with coupler "a" will have the contiguous couplers set so as not to couple, and cars will be run together at ordinary speed of shifting.

Third Test—Couple the two cars equipped with coupler "a," both at the ordinary speed used in hand coupling and at such greater speed as will fairly represent the blows frequently received by cars in yard shifting, by uncoupling after each case. Cars with coupler "a" will then be thrown out on a siding and couplers "b," "c," etc., proceeded with in like manner.

In the above tests the couplers will be tested as presented, and the promoters of any couplers which employ a loose link shall furnish the link to be used, after which the standard, 10¼-inch link (inside), shall be tried in each of such couplers.

In the meantime, and as cars are thrown on the siding, the end of one car contiguous to the other car of each pair will be blocked up so as to raise the center of coupler 3 inches, and test No. 3 will be repeated subsequently on a track having 20 degrees curvature (as nearly as may be found convenient), and with the cars in this position; also with the blocking removed, so as to lower the coupler to its normal position, and in each case the standard, 10¼-inch link, will be tried after completing tests with the link presented, unless previously found to be unnecessary.

The committee also recommended that efficient police regulations be made to expedite the tests and to avoid personal injuries, and that only the representatives of each coupler be present at the cars when it is tested, in addition to the railroad commissioners and others invited.

It was further agreed that Mr. Wilder be a committee of one to manipulate the cars during the test. Mr. Wall was authorized to prepare descriptive notes of the various forms of couplings tested, and report on their adaptability to the general forms of cars now in service.

THE TESTS.

The tests were not carried out exactly according to the arrangements outlined above, but nearly so. The cars were tested on the tangent and on the curve at times that suited the convenience of the yard. On measurement, the curve was found to be 20 degrees 20 minutes, sharp enough to test the couplers very well. A coupler that works easily on a 20 degree curve, with one end of the car raised 3 inches, is not likely to be troublesome in service if it has not other defects. At a meeting on the evening after one day had been spent in making tests, the Executive Committee amended the rules by striking out the part requiring a test on the curve with the blocking removed. It was sensibly concluded that, if a coupler went successfully through the test when the car was blocked up, it was not likely to fail where the two heads were level.

Mr. F. M. Wilder conducted the tests, giving the orders for moving the cars, and all agreed that the work was very fairly and satisfactorily performed. Messrs. Wall and Cloud inspected each coupler, noting its points, and the former gentleman had the height of the coupling and the distance the cars were apart recorded. This was an important point, as some of the couplers materially increased the distance between the cars. The remainder of the Executive Committee sat around and made private memoranda of what they thought of each coupling.

COUPLERS REPRESENTED.

When the car couplers sent in for trial were counted up, it was found that forty-six were placed on cars, and in most respects conformed to the conditions of test laid down by the committee. In one or two instances the couplers were placed on one end of the car only, and some of the couplers had come to grief on their journey to Buffalo and were broken; but the committee were not disposed to act strictly to the letter of their rules, and all the couplers present were tested, except four that had no representatives to look after them. The understanding was, that when a coupler did not act satisfactorily on the preliminary test on the straight track, the committee would put it aside without testing it, with one end raised on the curve; but only three of those tried on the tangent failed to appear on the curve. This surprised many people, for several couplers that went through the whole ordeal were failures from the first, and altogether so unsuitable for the requirements of the mildest train service, that it was hardly expected the committee would waste time trying them at all.

OPINIONS GRATIS.

During the continuance of the tests a large crowd of people was constantly in attendance, and the committee had to issue badges to those entitled to witness the tests, and even then the police had great difficulty in keeping back the crowds so that the committee, the members of the press and the railroad commissioners could see what was done. There were numerous judges round. The crowd seemed to be composed principally of railroad train or yard men, and they were exceedingly unreserved in the expression of their opinions. Nearly every coupler man took notes of the conduct of each rival coupler, and several of these men were extremely offensive in the remarks they made about couplers, many of which were better than their own. It seems natural for each car coupler inventor to regard his own device as being better than anything else in that line, but most men express themselves to that effect only in strict confidence. Several conspicuous exceptions to this rule were met with at the Buffalo test. All the three days the test lasted one man went round continually proclaiming to all and sundry, including other inventors, that his coupler was the best in the field, and heaping abuse and ridicule upon all the others for not retiring on sight of his paragon of perfection. Another inventor was prepared to lick any man who would dispute the merit of his invention, which was unique in its way. Neither of these men's inventions appeared on the list recommended for further trial.

COUPLERS ON TRIAL.

The first coupler subjected to the preliminary test on the straight track was the Russell-Eccentric. This was an ordinary link and pin coupler with a cylindrical block fastened eccentrically inside the head for the purpose of holding up the pin before the coupling was made. The entrance of the link pushed back the block and permitted the pin to drop down. The tests made were: 1. back up slowly with car having ordinary draw-head to couple with automatic coupler; 2. back up slowly with the automatic coupler to connect with the other automatic head, but not to couple; 3. back up slowly to couple; 4 back up fast to couple. This coupler went through the tests on the straight track and on the curve without a failure. A standard link was used.

The next coupler tried was the McKeen, which was attached to Lehigh Valley cars 4,024 and 3,996. It is the invention of Mr. Thomas McKeen, and is of the link and pin type. This coupler was subjected to some severe tests, both on the straight and on the curved track, but it went through them successfully.

The Curtis & Wood coupler came next. It was attached to two Lehigh Valley cars, and a great many of the couplers are reported to be working very successfully on cars belonging to that road. On the straight track this coupler, which is of the hook and link variety, coupled all right on each of the tests with the standard link and different sizes of links, but when it was tried on the curve with one end of the car raised 3 inches, it failed each time. Till this happened, the coupler was a favorite among those able to judge. It appears the couplers sent to the test were different from those that have been for some time in use on the Lehigh Valley cars. The inventor thought he perceived a point where the coupler could be improved, and had the pattern altered just in time for the test. The head was made fuller and stronger, but the additional material proved sufficient to prevent the link from entering when it had to be pointed with the sharp angle due to the other head being raised.

The Payne coupler, which also was placed on Lehigh Valley cars, is the kind where a link is used, a hook secured in the head performing the functions of a pin. On the tangent this coupler failed in most of the tests, but on the curve it coupled when the owner's link was used. The hook was too wide for the standard link.

The Archer coupler, the invention of Mr. S. B. Archer, an experienced New England railroad man, is of the link and hook kind. It was placed on cars belonging to the Delaware & Hudson Canal Company, and a great many of the cars belonging to that road are already equipped with it. It went through the whole series of tests very successfully, but a link with a 2-inch opening had to be used. On the tangent, this coupling was subjected to a particularly sharp bump, but it caught on.

The Smillie coupler is of the link and pin kind, but requires a special link, which has a bridge in the middle which engages with the operating mechanism, a small link fastened below the draw-head. It went through all the tests successfully.

The Marks coupler, invented by Mr. C. E. Marks, was attached to two Flint & Pere Marquette cars. It is an ordinary draw-head with a hook fastened inside to catch to hold up the link. It received some rough bumping, both on the tangent and curve, but it coupled each time. This was one of several couplers that got more than the ordinary sharp blows in coupling, the committee evidently wishing to see how much it would stand in the way of rough usage.

The Union was the next coupler tried. It is of the hook and link kind. On the tangent it failed when tried with the inventor's link, which was 10 inches long inside, but it coupled when the standard link was put in. It acted satisfactorily on the curve in all the tests, a standard link being used.

The Lancaster coupler, equipped on two Valley Railroad cars, was of the link and pin type. A special pin was used, fastened to the middle of a cross-piece that spanned the draw-head and rested in a slot left in the casting. It was a very simple device, but the slot weakened the draw-head. In the trials on the tangent it failed to couple when the cars were brought together gently, but when they were bumped pretty hard it caught on. The blow was, however, too hard for the weak draw-head and it broke. That ended the Lancaster test.

The Kiely coupler was next taken up. It was the link and hook kind. It failed twice before coupling with switching car. When the two automatic couplers were set not to couple, it failed by coupling. This was repeated twice with the same result. In fact, it proved an inveterate coupler, holding on every time on tangent and curve, whether set to do so or not.

The McCrae coupler was called by the inventor a pivotal coupler, a common link being held by a pivoted hook secured inside the head. When provided with the owner's link, it failed on the third test on the tangent and on the second test on the curve. With the standard link it failed twice on the curve when tried with the car moving up slowly, but it coupled when a sharp bump was given.

The Boston automatic coupler was the first hook coupler tried that couples on a vertical plane. It went through all the tests satisfactorily.

The Barnes coupler was tried next. It was one of the couplers that attracted the most attention, owing to its peculiarities of construction. An ordinary draw-head is used, which acts as a bumper, or to couple with cars not fitted with this device. Through the draw-head a long pin passes and enters a hole in a holding-brace. Beneath the draw-head a hook resembling a thin Miller coupler is secured, which is operated by the handling mechanism on the end of the car. When the cars come together the hooks on each car engage automatically with the pin passing through the draw-heads, making a double coupling. It passed through all the tests successfully, and it got some very rough handling. The leading objection raised among the practical men present to this coupler was, that it coupled beneath the line of the draft-timbers.

The Eureka, a link and pin coupler, went through all the tests without failure.

The United States coupler, one of those prescribed by the Railroad Commissioners of Massachusetts, is a link and pin coupler, the pin having a fin attached to it with a pawl for holding the pin up before coupling. The coupler went through the whole of the tests without any failure. A great many of these couplers are in use on New England roads, and master mechanics present talked very highly about them.

The Gifford coupler, which was attached to New York, Lake Erie & Western cars, was next tried. It is of the link and hook kind, and is very simple in construction. It went through all the tests on tangent and curve satisfactorily. There are said to be nearly 5,000 of these couplers already in use on cars belonging to different roads.

The Thurmond coupler, the invention of a Georgia man, is of the type that couples on a vertical plane and locks by ravity. This coupler is simple and neat in construction, and has been a favorite ever since it appeared. It went through all the tests very satisfactorily, and got some heavy bumps that had no bad effect upon it.

The Brown coupler was of the link and pin type. It made a poor record on tangent and curve.

The Joo coupler was of the hook variety, coupling on a vertical plane. It went through all the tests without failure.

The Muller coupler was a hook coupler coupling on a vertical plane. It went through all the tests without failure.

The Le Roux coupler had the ordinary draw-head, with a hooked bar taking the place of the link. This coupler went through all the coupling tests fairly well, but it displayed a strong tendency to uncouple when the car was being switched in the yard.

The Hill coupler was of the hook type, coupling on a vertical plane. It went through all the tests satisfactorily, and received some very rough usage. It was a good deal of a favorite and only one objection was urged against it, which, however, was serious, for it couples with the hook facing the opposite side to the hook of other couplers of this type, so that it never could be made interchangeable.

The Whitman coupler was of the link and pin kind. It passed through all the tests with one failure.

The Cowell is a combined automatic hook and link coupler. It was subjected to rather a severe series of tests, but it went through them without any failure. There was a disposition manifested among some of the coupler men to imply that the leading automatic couplers now in use would be passed over without a proper test, and the committee gave such couplers specially hard trials, evidently to show that they exhibited no favor.

The Ames coupler was subjected to severe tests on tangent and curve, and made no failure. But after the tests were made, one of the rival coupler men started a story to the effect that the Ames agent got the height of the raised end reduced ; so a second trial was called for on the curve. The coupler passed the second trial precisely as it did the first one.

The Stamford coupler was made after the style of the Ames, with a draw-head and special link. It failed badly on curve, but was not regarded as ready for testing.

The Hitchcock coupler was a hook very similar to the Miller, with a fluke-like holder. On the tangent it failed twice. When it was taken to the curve, the men in charge could not uncouple it. It was taken to the tangent and uncoupled and returned to the curve for trial, but failed in most of the tests.

The Meadows coupler was a combination of an ordinary draw-head and a hook coupling on a vertical plane. It was an awkward rig, but coupled all right on the tangent.

The Emmett coupler enjoyed the distinction of being the most curious coupler on trial. Its inventor is a sculptor, and he took his idea of a coupler from the joints of the human backbone. The device he produced from this idea was a sort of universal joint, that displayed a greater tendency to keep together than to let go. It had the attributes of a good coupler, but it took a yard full of men with crowbars to uncouple it. One claim made for it was that it would couple if the car was upside down, and we believe the claim was just. The coupler will, no doubt, become popular when they begin running cars upside down. This coupler came from Columbus, O., and a joke was attempted at the expense of Mr. Wall, of the committee, by some of his associates alleging that he helped to perfect the device.

The Williams coupler had an ordinary draw-head, with hook inside for coupling with link when it had to connect with any strange draw-head. Fastened to the side of the head was a hook that turned round and coupled on a vertical plane, the side of the draw-head being used as the hold for the hook. That is, the draw-head on one car acted as the hold for the hook fastened to the head of the other car. It was an awkward-looking arrangement, but it went through the coupling test fairly. When being pulled out from the curve the coupling unhooked twice.

The Dowling coupler was one of the favorites among those that couple on a vertical plane. It went through the tangent tests very well, but failed on the curve. The failure, we believe, was caused by an attempt to improve on the couplers in use by putting in more material.

The Fitzgerald & Van Dorn coupler is an ordinary draw-head coupling, by means of a hooked bar. It went through the tests all right.

The Hein coupler is of the hook type, coupling on a vertical face. On the tangent it coupled when the cars were brought together slowly, but failed with a sharp blow. On the curve it coupled and failed under the same conditions as on the straight track.

The Titus & Bossinger is of the hook coupling on a vertical plane type. This coupler has met with considerable appreciation on the Chesapeake & Ohio and other Southern railroads, and is highly spoken of among those who use it. It went successfully through very severe tests on tangent and curve. The hook is held in position by a cam, and it couples without being touched by hand.

The Curry coupler is an ordinary draw-head with link and pin, a yoke being connected with the pin for opening it. The inventor is something of a doctor, and the circular regarding the coupler assured all concerned that the inventor cures all kinds of liver and stomach complaints. The coupler failed once and coupled twice. It was a crude rig.

The Janney coupler was subjected to severe tests, principally to show that no favors were given even to the greatest favorites. It went through the tests on tangent and curve quite satisfactorily.

The Perry coupler was an ordinary draw-head with link and pin with means for operating them without going between the cars. It passed through the tests all right.

The Bird coupler was of the link and pin type, very simple in its operation. It passed through the tests without failure.

The Wilson & Walker was a vertical hook coupler, and attracted considerable attention owing to the whole of the parts being forged, and splendid specimens of forging they were. It passed through severe tests satisfactory, both on tangent and curve.

The Morgan coupler has an ordinary cast-iron head, which is spanned by a hook fastened to a ledge on the opposite head. It passed the tests all right.

The Hilliard coupler is something of the same type as the Morgan. It also did fairly well in the tests.

The Murphy coupler was a singular device. The head resembled the ordinary draw-head, but there was a movable jaw on each side of the head which opened to admit a dart-headed draw-bar. This bar had a dart head on each end and the hold the movable jaws took of this made the coupling. Means were provided for raising or lowering the bar when coupling, and for opening the jaws to uncouple. The coupler went through all the tests in good shape.

THE DECISION.

The tests lasted through the greater part of three days. On the evening of the day they were finished, the executive committee met to consider which couplers should be recommended for the trial of regular service. After a sitting of five hours, they issued a notice stating that they recommend the following twelve couplers for probation :

McKeen,
Perry,
Archer,
Gifford,
Marks,
Ames,

Cowell,
Dowling,
Thurmond,
Hein,
Janney,
Titus & Bossinger.

Considerable discontent with the result was expressed by the disappointed coupler owners and their friends. The executive committee had a most difficult duty to perform in making a decision among so many good couplers as were tried in these tests, and we believe they acted fairly and conscientiously.

Shop Notes.

ILLINOIS CENTRAL.

At the Chicago shops but little new construction is in progress, considering the capacity of the shops, but there is a good deal of repairing, including 18 passenger cars that are being thoroughly overhauled. A Pullman sleeper, damaged in a wreck, is being rebuilt, and one of the passenger cars of the road remodeled. Five new stock cars are being turned out every week. They are built with outside stake-pockets, and Mr. Sanders, the foreman of the shops, speaks highly of the advantages of that plan in facilitating repairs. The cars are most substantially built, well braced and carried by a modification of the Thielsen truck, which is the standard of the road for heavy cars. The only new passenger work being turned out is one set of trucks complete every month.

Mr. Snow has been experimenting lately with axle-boxes on his passenger equipment, to find out whether or not a change from their established pattern is desirable. Most of their cars are equipped with the Timms patent box, which has a leather collar that fits into a grooved band shrunk on the axle between the journal and wheel. One of the suburban cars ran with boxes of this kind for eighteen months without change of brasses. At the end of that time the journals were measured and found reduced only an average of $\frac{1}{32}$, while the brasses had lost only 4¼ ounces in weight. Some cars have also been run very successfully with the M. C. B. standard axle-box. The road is using a journal 4 inches in diameter. Some of these have been running two years under coal cars subject to very hard service, and show no appreciable wear, $\frac{1}{32}$ inch reduction in diameter being the greatest.

The directors' car of the road is 64 feet long, weighs 62,000 pounds, and is provided with every requisite for the comfort and convenience of its occupants.

An air pump is used in the shops for thoroughly testing the Westinghouse air brake of each car before it is put on the road. The auxiliary reservoir is filled and held at 60 pounds pressure during the tests, and the hose on the ends of the cars are tested under a pressure of 80 pounds. All car wheels used by the road are made in the foundry connected with the shops. The weight of the wheels ranges from 450 to 600 pounds, and an average of 54 are turned out per day. The wheels give entire satisfaction in all the varied service. The mixture used in casting is the same as that used by the Union Pacific Railroad Company, namely: 44½ parts old wheels selected from those belonging to the road, 3½ parts of old steel rails, 9¾ parts Lake Superior No. 2 iron, 42¼ parts Salisbury iron.

We are under deep obligations to Mr. Sanders for a most interesting talk about car repairing, during our visit to the shops.

CLEVELAND, COLUMBUS, CINCINNATI & INDIANAPOLIS.

In the shops of this road at Cleveland, they have six engines undergoing a general repair. They intend beginning to build a new mogul engine of their standard pattern next month, the material having been on hand for some time. The shops are old and overcrowded, so that work has to be done under great disadvantages. During a brief visit, we happened to miss both Mr. Turreff, Superintendent of Motive Power, and Mr. Hudson, Master Mechanic, but Mr. T. A. Lawes, the general foreman, showed us all there was to be seen. Mr. Lawes is a good representative of a class of men now found in the drawing office or holding a responsible position in the shop of nearly all railroad mechanical headquarters. They have sound technical education, in addition to extended and varied mechanical training. These men are apostles of mechanical progress, based on scientific principles. Their influence will be made manifest in the railroad mechanical world before many years.

A good feature about these shops is the tool-room, which is quite modern in its arrangement and equipment. The drawing office is also worthy of the road. In the shops we found numerous ingeniously arranged methods of facilitating work—invention in many instances being called on by hard necessity. For truing reamers after they have been hardened, a small emery wheel is fitted to the tool post of a lathe, and motion for it transmitted from a small supplementary countershaft. They use a Stow flexible shaft for transmitting power to many operations. We found it driving a boring mill that was operating on a locomotive cylinder.

Mr. Steinbrenner, Master Car-Builder, is doing no new work, but has considerable repairing of freight cars going on. He is changing a steam shovel into a wrecking derrick, and turning an old coach into a combination car. They take in all passenger cars once a year and give them two coats of varnish. Tuscan red is the color used on the road, and in painting they use the A B C Murphy system, which gives entire satisfaction.

BUFFALO, NEW YORK & PHILADELPHIA.

Mr. Allen Vail is the Superintendent of Motive Power, and under his supervision the machinery of the car and locomotive shops is kept in first-class order. The shops are old and inconvenient for doing work economically, but the tools are nearly new, all of modern types, and the management is looking forward to the better times when they can build good shops on the ample ground they have got ready for the purpose.

Power is transmitted from the machine shop to the car shop, a distance of 312 feet, by means of a wire rope ½ inch diameter, run 6,900 feet per minute. The rope has been running two years without costing a cent for repairs.

Engine No. 7 was getting painted after having undergone a thorough repair, which included new cylinders and tires. The fittings on the boiler-head are all new, and are arranged with an eye to artistic effect, a thing that is sadly neglected on many roads where the boiler-head fittings are constantly stuck on in a way that violates all rules of visual harmony. A mechanic generally wishes to have all his work "square" and orderly till he gets inside the cab. There his solicitude for order ends. He appears then to think only of finding room for the numerous attachments, and a boiler-head is often ruthlessly cut up through want of a little forethought and ingenuity in planning. As we enter the cab of this Buffalo, New York & Philadelphia engine, we see a handsome steam case on the front of the boiler-head, from which most of the other attachments take their steam. At each side of the steam case is a Monitor injector, each being set in the same position, and all the smaller attachments are arranged to work as if their presence was the result of design and not of accident. This engine is equipped with a brick arch supported by water tubes, and the fuel-saving spark-arresting capability of the arch is fully appreciated on the road.

They are finishing a new tool car to form part of the wrecking outfit. The car is 50 feet long, and is so arranged that the wrecking material will all be secure and yet be easily reached, the general plan being, a place for everything. Each end of the car is devoted to material and the middle to the housing of the foreman and workmen connected with the wrecking outfit. The foreman has a separate room fitted up with desk and folding bunk. The men's room has all conveniences for comfort. Lockers are used for seats, and they are made the receptacle for the men's supplies, while they can be turned into beds with little work. Folding bunks are arranged above the lockers so that there are two rows of beds when that amount of accommodation is required. The car is also supplied with lavatory and kitchen. The car is carried on two 4-wheel trucks of the road's passenger standard.

In the painting of locomotive and cars, this company secure uniformity by keeping blue prints of the designs for each class of engine and car. The style and position of the lettering are indicated in the drawings, also all lining and other ornamental work. The color is mentioned in the blue print, and cards are supplied with the shades of color painted on them.

BROOKS LOCOMOTIVE WORKS.

These works are by no means busy considering their capacity for turning out work, but they are doing more now, and are therefore employing more workmen than they have done for a year or two. They are building ten ten-wheel engines for the Burlington, Cedar Rapids & Northern Railway, and working on several small orders for Southern roads. They have recently got out patterns for a new derrick car, which is very convenient for wrecking and other purposes. They are building two of these cars for the Old Colony Railroad. There is a growing demand for the Thurber wheel, which they make, and that is giving some additional work. Well-perfected dies, matrices and formers have been made to facilitate the manufacture of this wheel. During the course of a ramble round the shop with Mr. J. H. Setchel, the superintendent, we noted many desirable improvements which he had effected.

A new wood-working shop has recently been added to the works. The main shop is 52 × 180 feet, and the machine shop 25 × 30 feet. All cabs, tender frames and other wood-work connected with locomotive building are built here. A good arrangement connected with this shop is a vestibule that holds a car. On a cold day, when a car has to be put into the shop, the outside door of the vestibule is opened and the inner door kept closed. After the car is put into the vestibule the outside door is closed and the inner door opened, the car passing inside the shop without admitting any cold air. An arrangement of this kind would be a most welcome improvement to many car and paint shops, and would pay for itself in a very few winters. This wood shop has an excellent equipment of heating pipes. All the shops are lighted with electricity. There is a large fire company belonging to the shops, and the men are drilled to their work at frequent intervals.

CHICACO CABLE RAILWAY.

The Chicago Cable Railway Company are making extensive alterations at their shops, at the corner of State and 21st streets, Chicago. A large portion of the building that was formerly used as stables, is being changed into an extension of the machine and repairing shops. As this company follow the questionable policy of building all their own cars, it takes considerable space for the work. They have a great deal of very fine machinery in the place, and a good system of doing the work is carried on under the able supervision of Mr. M. Ohlson, master mechanic of the company. Some extension of the cable roads is contemplated, and the company are increasing their power at headquarters by putting in two new Whelock engines of 500 horse-power each. There were formerly four of these engines, each of 250 horse-power, for doing the work. Connected with the new engines are two very heavy miter gear wheels.

An interesting operation connected with these works is the burning of horse manure in the boilers furnaces. The company own 1,500 horses, which produce an enormous quantity of manure that for years had to be carted away at great expense. One day it struck the master mechanic that he could burn the greater part of it in the furnaces by making some special provision for draft. He connected a fan in the works with one of the furnaces to supply artificial draft, and found with that change that the stable manure could be utilized as fuel. All the furnaces were afterward altered, and a fan put up to supply the draft. The boiler furnaces now burn up all the manure made at the company's stables, and a good deal more that is carted in from other places. No coal is used except when they fall short of manure.

Qualifications of Shop Foremen.

At the September meeting of the Western Railway Club, the following letter was read from Mr. Geo. W. Stevens, Master Mechanic of the Lake Shore & Michigan Southern road, at Cleveland, O.:

Wm. Forsyth, Secretary.

DEAR SIR: Other engagements preventing my presence at the club meeting, I give herewith a brief outline of the question of selection and qualifications of shop foremen. The selection should be made from the shop force, and from the class that are active, energetic, conservative and progressive, with moral character predominating, giving preference to the oldest men if merits are equal. In qualifications some knowledge of figures, reading and writing is essential; being able to comprehend orders clearly and quickly, mechanical skill, executive ability, systematic and thoroughness of work, and a full knowledge of what should be done as well as how it should be done are also desirable. Too much value can not be placed on ability to impart knowledge to others, and it should be constantly the aim of the foreman to explain clearly and direct. Many fail in this particular and attempt to perform themselves what should be done by others. The old saying, as with the captain so with the soldiers, is especially applicable to shop foremen, and any foreman can quite accurately be judged by the performance of the men.

G. W. STEVENS.

THE probability that iron will soon enter largely into the construction of cars renders particulars about the behavior of wood and metal when combined in a structure, ierestting to car-builders. The change from wood to iron and steel in ship building was made slowly, and composite vessels made of wood and iron prepared the way for metal alone. It is probable that car-builders will follow a similar course when scarcity of good lumber compels them to begin using metal in car building. Reports recently made regarding naval vessels show that wood incased in iron is peculiarly liable to decay from dry rot. In cases where unseasoned oak timber was incased so that the air could not reach the timber, fermentation of the juices ensued and the wood decayed in a few years. Many English and French ships have been rendered worthless from this cause. The lesson taught is, do not incase wood with iron unless it be first thoroughly seasoned so that no juices are left in to ferment and eat away the heart of the wood.

Communications.

Locomotive Fuel Economy.

To the Editor of the National Car-Builder:

I notice in your September number a statement of the performance of passenger trains on the Pittsburgh, Cincinnati & St. Louis road, in which a remarkable record is shown for the month of June. While I admit the economy in fuel therein indicated, I must take issue with the writer in his assertion "that similar records are rarely if ever equaled by other roads." In refutation of this I would refer to the still more remarkable record made by the Minneapolis & St. Louis road on its passenger trains during the month of July, which, to say the least, is phenomenal. The article referred to, not containing any freight train figures—that is, the average number of cars per train—I am unable to compare results on the two roads with respect to this important branch of service. I will therefore take the passenger train performance, which is as follows:

	P., C. & St. L.	M. & St. L.
Average number of cars per train........	3.1	3.9
Coal consumed per train-mile..............	35.5 lbs.	47.1 lbs.

These figures show apparently a superior economy on the P., C. & St. L., but the difference is accounted for in the qualities of coal used, the M. & St. L. having used an inferior quality of Iowa coal, while the former road is presumed to have used Ohio and Indiana coal, which is much better. Now, if we deduct 30 per cent.—a very low estimate for difference in carbon qualities of fuel—we have 32.9 lbs. per train-mile for the M. & St. L., or 2.6 less than the P., C. & St. L. This deduction is an extremely low estimate for the difference in the two kinds of fuel, it having been shown by practical tests that 35 per cent. should be the minimum.

The record of the M. & St. L. is still more remarkable, when it is considered that it was made under difficulties with which its competitor did not have to contend. I refer to the high winds, which operate against fuel-saving on locomotives, especially on Northwestern roads, to say nothing of the better track and superior facilities of the P., C. & St. L.

I would suggest that other roads give their experience in fuel economy, and that by a comparison of records thus obtained much mutual advantage may be derived. F. W.

Rolling Stock, Past, Present and Prospective.

To the Editor of the National Car-Builder:

There are some things in the operation of railroads that are apparently beyond the control of human agency. Years ago, a strong effort was made to build cars with a capacity for carrying a maximum load of 10 tons, and in no instance was the load allowed to exceed this limit, unless the load was granite, marble or heavy machinery, or when a single article weighed more than the maximum. For such freight, special extra strong cars were built, and stenciled to show the duty they were to perform. But in spite of the utmost vigilance, cars were constantly overloaded, and there seemed to be no effective remedy for the evil but to build cars of such increased strength and capacity that the inducement to overload would be greatly lessened. About the same time it was discovered that too great a proportion of non-paying weight was being hauled. It was an easy matter to build cars that would carry much more than 10 tons, but in doing so there was an increase of dead weight; and an effort was made to reduce the weight without impairing the strength of the cars. This was successful to a certain extent, but the overloading continued as before, and nothing remained to be done but to increase the capacity of cars regardless of weight. It was apparent that the rulings of railroad officials in regard to the building and loading of cars must yield to the requirements of traffic and the demands of shippers, and it has come to pass that the old 10-ton maximum must give place to 20 and even 30 tons.

It will thus be seen that the railroads are the servants of the public, and that they must conform to the demands of their patrons in the matter of loading cars and in the speed of trains. While there are some objections to 30-ton loads, the increase in capacity gives car-builders an opportunity to reduce the dead weight so as to carry a larger proportion of paying load than was practicable with 10-ton cars. These must of course be heavy enough and strong enough to carry themselves and the ten tons besides. Any addition to the weight of the car increases its carrying capacity; so that in reality the last ton added to a car load gives the greatest proportion of paying load. It is therefore economy to build stronger cars and carry heavier loads; but it will not pay to haul such cars around empty. The advantages in handling short trains are obvious, and the economy in first cost and repairs is largely in favor of 30-ton cars. Less room is required on sidings, and there is less crowding in track yards; while, on the other hand, the trains will be more destructive to bridges and require more material and greater strength in bridge construction. In preparing for the new departure, it will, of course, be necessary to introduce many improvements in the details of the running gear of cars. The trucks may be improved by the use of more iron and steel as material, as well as by a more judicious use of wood. The parts that will most need looking after are the wheels. Even with the present comparatively light loads and moderate speed of trains, there are a good many broken wheels. But as this matter is already exciting some attention among railroad men, I forbear making any suggestions.

In respect to locomotives and their present adaptation to the demands of the future, it is manifest that some important improvements are needed. Not that the present types are greatly lacking in power or spee but they do their work, as a rule, in a clumsy and unsatisfactory manner. It is not a characteristic of our people to leave any thing by the wayside in the march of progress that is worth turning back after, but an exception may be made in the matter of locomotives. In 1852 a New England shop turned out locomotives that made a "light weight record" that has never been beaten, and this with their diminutive fire-boxes, and cylinders varying from 12″ × 16″ to 16″ × 20″, and drivers from 66″ to 72″, and weighing from 18 to 22 tons, with tenders. They were inside connected, had 4-wheel trucks, 4 drivers coupled, 6-wheel tenders and independent cut-off, were wood burners and good steamers, and settled down to their work as if they felt an interest in it. They had no difficulty in making 50 miles an hour with the passenger trains of the period, and even 60 and 65 miles under favorable conditions of track. For many years these engines were favorites on all roads where they were used, but after a time when they were taken in for repairs, they were remodeled in accordance with the notions of master mechanics, and finally "monkeyed" with and spoiled. Since then all sorts of improvements have been tried, and in the main have been failures, although some of the lost ground has been recovered by real improvements.

It may be presumptuous, but it seems to me that the readiest way to get the locomotive of to-day in the most effective condition for future service, is to progress a step backward, by returning to some of the leading features of the machine as they were thirty years ago. Certainly the track-crushers now in vogue are not adapted to the fast trains that are being clamored for in passenger service, and the monster with the many-coupled drivers must needs come down to four-coupled for fast freight.

Wm. S. Huntington.

Improving Compound Locomotives.

According to British engineering journals the compounding of locomotives is occupying a great deal of attention among those interested in the economical operating of railways. Although the work done by Mr. Webb with his compound locomotives attracts great attention, and the engines are growing in popularity, there are still serious objections raised to adopting the engine in its present form. As our readers are mostly aware, the Webb locomotive has two small high-pressure cylinders that are connected to the outside of the back drivers, and a single large low-pressure cylinder placed under the smoke-box, which transmits the power to the forward driving wheels through a crank axle placed in the middle of the axle. If any American master mechanics contemplate trying compound locomotives, we would advise them to consider some suggestions made regarding this form of engine by the *Mechanical World*.

That paper recommends the placing of one high-pressure cylinder only between the frames in the place occupied now by the large low-pressure cylinder, and to place two low-pressure cylinders of the same diameter as the high-pressure cylinder outside the frames, in the position now occupied by the high-pressure cylinders. By this arrangement all the cylinders would be of the same size, and the various parts therefore interchangeable.

The most obvious difficulty in this arrangement appears to be in starting with a high-pressure cylinder only, but we think, says that paper, that this would not be an insuperable difficulty, for with low-pressure cylinders of moderate size, a very simple device would serve to allow the initial boiler pressure to act, and, indeed, with three cylinders of this diameter the engine might be made very powerful by using boiler steam in all these cylinders, but this can not be done now when the low-pressure cylinder is so excessive in diameter. Even with the present ratio of 1:2.3 the arrangement we suggest would be readily carried out with cylinders of one size in every respect, simply by an alteration in the high-pressure piston, which could be made longer, and the stroke of this cylinder could be shortened to correspond. Then there would be no excess of clearance in the high-pressure cylinder, the space left by the portion of the stroke cut off being filled by the deep piston, which would, of course, be a hollow shell. In our opinion the great advantage of the compound locomotive is mechanical, and not due so much to the compound principle as to the fact that the coupling rods have been dispensed with. Coupling rods absorb much power, and in the compound engine this lost power is saved, and yet the full advantage of coupling is obtained in increased adhesion. Now, we have pointed out before that the extra adhesion due to the coupled pair of wheels is obtained only by virtue of the slip, which is known to take place in all engines when running. Experiment has shown that an engine makes fewer revolutions per mile run when fitted with side rods than it does when those have been removed. If no slippage occurred the side ends could do work possibly. Thus the advantage of coupling is obtained by the three cylinder arrangement, without the great friction wear and tear of the side rods. Hence we see no reason why the compound locomotive should not be constructed with three equal-sized cylinders; of course, the flow of steam to the low-pressure cylinder would be more intermittent, but it would amount to the same in volume, and, as a counterbalance to this, the two low-pressure cylinders would draw their supply in smaller measures if oftener than the present huge single cylinder. A moderate amount of receiver and pipe capacity would obviate every inconvenience therefore arising from this cause. The starting from rest of a three cylinder engine with boiler steam on each piston would be powerful and rapid, and the engine could, when fairly running at eight or ten miles an hour or less, be converted into a compound by the turn of a lever.

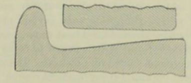
We should like to see a locomotive on this principle, embodying details of less divergence from present types than the class hitherto built, and yet fully preserving all the advantages gained in the mechanical action of the machine. Should the latest compound locomotives, with 30-inch low-pressure cylinders, be thought to show any special excellence in performances, it must not be overlooked that they are practically equal in cylinder capacity to an ordinary engine with two cylinders, each of 21 inches diameter, a size not yet attained in this country if it has been elsewhere.

The Prevention of Flange Wear.

Having recently learned that Mr. George W. Cushing, Superintendent of Motive Power and Machinery of the Northern Pacific road, had effected some improvement in his method of hanging brake-shoes, which, to a great extent, prevented the cutting of wheel flanges, we have received from him the following letter in reply to a request for particulars :

"The report you refer to came about probably by what has been said to a number who have brought up the subject of flange-cutting on wheels, and to whom an opinion as to the cause of a good portion of it has been freely given.

"Brake-heads are usually adjusted to the beam so as to have the face of shoes fit new wheels having probably a standard taper and shape. No provision is made, either in heads or shoes, whereby a *new* shoe applied subsequently may fit the wheel partly worn and have a proper bearing on same. The relative position of shoe and wheel may have become as shown in the cut, or perhaps much worse in shape of wheel at the second, third or fourth removal of shoes.



"The effect is that that the brake pressure is sufficient to spring the brake-beams and incline the shoes toward the wheel flanges, and generally one side gets the start and forces its position into the flange until the shoe is worn into position and seats itself naturally.

"Our through trains make a run of over 1,900 miles, and in this distance three mountain ranges are crossed, requiring continual use of brakes for many miles.

"Dining cars in service at this season average 8,500 miles, and sleeping cars 6,000 miles per month. There are, of course, frequent renewals of brake shoes *en route* and opportunity to observe the result of changes.

"As an experiment, I have had the brake-heads, in case of renewals of shoes on old wheels, shimmed up under the flange next to beam, so as to incline them toward a proper bearing on wheel. These have seemed to run much better than those not so inclined, and doubtless are much better for the life of the wheel. Will not this serve to hint in the direction of a possible improvement in the construction of brake-heads to enable shoes to be properly adjusted to wheels instead of *wearing* to such adjustment?"

British Railways in 1884.

The following is a summary of the railway returns of England, Wales, Scotland and Ireland for the year 1884, compiled from the statistics of the Board of Trade, the details of which are embodied in a voluminous report recently presented to Parliament :

Total mileage of double and single track	18,864
Passengers carried, 1st class	34,582,539
" " 2d "	62,265,220
" " 3d "	598,144,101
Whole No. of passengers carried	694,991,860
Receipts from 1st class	£3,481,017
" " 2d "	£3,105,008
" " 3d "	£17,606,040
Total receipts from all classes	£24,192,065
Gross receipts from goods traffic	£37,670,592
From excess of luggage, parcels, etc	£3,291,817
Mails	£783,077
Gross receipts from all classes of traffic	*£67,701,042
Net	£33,305,446
Total gross receipts per train mile	£3,589
Proportion of expenditure to receipts (per cent)	53
Total train miles (all classes)	272,803,220
Rolling stock :	
Locomotives	14,827
Passenger carriages of all kinds	33,031
Other vehicles attached to passenger trains	12,514
Goods wagons	454,945
Other vehicles not included in above	12,236

---

*This includes £1,763,491 received from holders of season ticktes, and not included in receipts from the three classes, as above.

The total railway mileage was increased during the year about 200 miles, and there was an increase of 11,273,723 in the number of passengers carried. There was a falling off of half a million in gross receipts from traffic, although the authorized capital had been increased £20,000,000. The receipts per train mile amounted to 5s. as against 5s. 1d. in 1883, the lowest earning ever before recorded. The working expenses, however, have not increased.

The growth of railways and railway operation in Great Britain within the past thirty years, or since 1854, shows an increase during that interval of 10,811 in mileage; 583,811,695 in passengers carried; £15,710,602 in gross receipts from passenger traffic; £27,699,822in gross receipts from goods traffic, and £1,079 in total gross receipts per mile of road.

The Largest Locomotive Nozzle in Use.

Mr. John Bingley, Master Mechanic of the Hanover & Gettysburg Railroad, writes some very sensible things to the *American Machinist* about locomotive fire-boxes and draft appliances. He says :

> While on a trip over some of the trunk lines recently, and in speaking to a master mechanic about the working of extension smoke-boxes, he said they were an expensive thing on freight engines, but the suburbs of our large cities run out so far that they had to use them. But, he remarked: "We haul away 18 carloads a week of sparks, and that is most all fuel." Eighteen carloads, at 20,000 lbs. each, can easily be figured. I saw, recently, some one speaking of a certain extension smoke-box who said they emptied out, I think, 20 bushels in 15 miles. I have no desire to own an invention like that. No wonder railroads go into receivers' hands—rather costive, as the old lady said.
>
> Mr. Frank Smith spoke about railroads running less than 3″ nozzles invariably coming to grief. He also spoke about back pressure in cylinders, etc. Very good logic, all.
>
> But I conceive that the best extension is to be made on the fire-box end, and it is only a matter of time when the master mechanics and purchasing agents will see it. This will give more thorough combustion, less smoke, no sparks. I say the proper place for sparks is in fire box, where they belong. I know some parties use hoppers and steam jets to drive them back into the fire-box, like the boy dragging his sled up the hill to skid down again.
>
> This company has several good engines, 17 inches × 24 inches, 18 inches × 22 inches, etc., and pays an average of $3 per ton for coal. We had heard about locomotives with large—very large—fire boxes. I said that is the true theory for economy and high speed. They concluded to try one, 18 inches × 24 inches, with Wootten boiler, 8 feet 6 inches × 8 feet fire box ; 345 tubes, 1½ inches diameter ; 68-inch drivers ; total heating surface, 1,415 feet. After working a little while, we kept increasing size of *single nozzle* from 5½ inches until it is now 6⅝ inches. I wonder if there is another locomotive in the United States with one larger than that ! We haul freight, and sometimes large excursion trains, over pretty heavy grades to Gettysburg. This engine hauled President Cleveland and his company in grand style and time. The report from coal yard is that this engine hauls the same trains with just half the coal the other engines do. We expect to save enough coal in one year to pay the royalty on the fire box. We are not bothered with sparks, black smoke scarcely any, steam always plenty. Mr. Henesy, of Baldwin Locomotive Works, who built her, says this is the only engine reported to them as making too much steam ; but by enlarging nozzle and using register in front door we have got that down fine. The firemen say it is a picnic to fire her, and they get sick sometimes when they have to change.
>
> Now, I just state these facts to induce thought. Any man, who is not prejudiced, will do well to turn his thoughts of improvement to the other end of the engine. Engineers of an adjoining road look down the smoke-stack, sometimes, at the nozzle of the engine I refer to; then you should hear them—"bucket," "barrel," "hogshead," etc.

Master Car Painters' Association.

The sixteenth annual convention was held at Toronto, Can., Sept. 2. There were 35 members present.

Several interesting papers were read in the order announced on the programme, and the discussions which followed elicited much valuable information. Selections were made of subjects to be considered at the next annual meeting.

A series of tests is to be made with colors prepared with different or varying portions of raw oil, japan and turpentine, so that it may be definitely ascertained which gives the best results as to wear on passenger cars, also with rubbing and wearing varnishes, and the finishing of wood in its natural color for outside finish of passenger cars. All committees will prepare panels in October, 1885, by the different methods given in a circular to be sent out by the Secretary, expose them to the weather on the east side of their shops, continuously until Sept. 1, 1886, and produce them for inspection at the next convention.

Exhibits were made of improved stencils for freight car lettering and railroad sign work, which did away entirely with filling in with pencil after stenciling, the letter being stencilled a full finish. Mr. D. D. Robertson, Master Painter of the Michigan Central Railroad, the owner and applicant for patent, stated that his road was saving fully 50 per cent. by the use of the stencil on their lettering.

Mr. E. L. Fetting, Master Painter of the New York & New England road, illustrated his mode of cleaning brass and plated car trimmings by a blue print, showing the plan of construction of tanks and other appliances used.

A number of finely-finished panels were shown for the inside finish of coaches, which were made to represent different varieties of wood simply by the application of colored stains on plain wood, and which could be used with good effect in the decoration of wood head-linings and the panel finish between windows.

The name of the Association was changed to the Master Car & Locomotive Painters' Association of the United States and Canada, and the date of the annual meeting from the first to the second Wednesday in September.

The officers elected for the ensuing year were: President, F. S. Ball, Pennsylvania Railroad, Altoona, Pa.; First Vice-President, William Davis, Canada Southern, St. Thomas, Ont.; Second Vice-President, E. L. Fetting, New York & New England, Norwood, Mass.; Secretary and Treasurer, Robert McKeon, New York, Pennsylvania & Ohio, Kent, O.

The vitality of the Keely motor delusion is astonishing. It has apparently died a hundred deaths, and yet there is one stockholder, Mr. R. S. Barnes, of New York, who has not lost confidence. He says the small steam engine used by Keely in his shop is soon to be replaced by a small vibratory engine for doing steady, practical work. Then is to follow the new and large engine of 250 horse-power, now being built by Newsham & Co. (a significant name), of Philadelphia, which will be wholly vibratory, the present being only one-third vibratory and two-thirds pulsating.

An immense chart, showing the area of improved, unimproved and forest land in the United States, has been prepared in the Agricultural Department for the Forestry Congress, soon to meet in Boston. The data were carefully gathered by correspondents in every county in the Union, and verified by correspondence with State authorities. It is found that there are 285,000,000 acres of improved land, 445,000,000 acres of forest and 730,000,000 acres of unimproved and waste untimbered land. Incidentally it is found that forests are disappearing at the rate of 25,000,000 acres each year.

Combustion in Locomotive Fire-Boxes.

BY ANGUS SINCLAIR.

Second Article.

LIGHTING THE FIRE.

Let us investigate the chemical processes that are involved in starting the fire in a locomotive fire-box and in the combustion of coal when the engine is at work.

Having thrown a quantity of wood over the grates, we strike a match, with its flame ignite some greasy waste, and scattering the burning waste over the wood, set fire to the latter. The phosphorus on the end of the match combines with oxygen at a low temperature, and we rub the match to raise the phosphorus to the igniting point by means of friction. The phosphorus flame raises the sulphur to the point at which that element combines with oxygen or burns, and the heat evolved is sufficient to set the hydro-carbon gas in the wood free, which in its turn combines with oxygen at the high temperature to which it has been raised and keeps the carbon or solid part of the match at the high temperature requisite for combustion. The flame of the match would not be sufficient to raise a large piece of firewood to the igniting temperature, because the extended surface would carry off the heat as fast as it was generated, without raising one point to the temperature of ignition ; so cotton waste saturated with oil, which consists principally of volatile hydro-carbons, is employed. The waste being in a state of fine subdivision, permits the flame to communicate its heat to small particles which readily ignite and spread the fire through the mass. This being thrown on the wood in the fire-box, lies burning on the individual pieces, and raises their temperature to the point which caused the elements of the match to burn.

A quantity of wood is needed to start the coal burning, for the same reason that greased waste was required to ignite the wood. The parts of coal are not so finely subdivided as the wood, and burning waste put upon the pieces would not raise the temperature sufficiently high to start combustion.

COMBINING PROPORTIONS.

When a compound is formed by the chemical union of two or more elements, the combination takes place according to certain definite and invariable proportions, presumably determined by the atomic weight of the elements. There is good reason to believe that each elementary substance is composed of a multitude of exceedingly minute particles or atoms. Were it possible to reach the ultimate point of subdivision, the atoms belonging to each substance would be found of equal weight. According to the atomic theory of matter, hydrogen, which is the lightest element in nature, weighs 1 in proportion to 16 for oxygen, 12 for carbon, 56 for iron, 63 for copper, and so on. The elements always combine in these, or in multiples of these proportions to form compounds.

COMBUSTION OF HYDROGEN.

When our fire began to burn, 2 parts by weight of hydrogen belonging to the hydro-carbons being expelled from the wood or coal, combined with 16 parts by weight (1 to 8) of oxygen from the air to form water, the process evolving intense heat. The water, which goes out from the flame in the form of steam, is the only tangible product of the combustion of hydrogen, and its weight equals the combined weight of the hydrogen and oxygen that entered into union. The presence of water as a product of combustion, can be perceived when a lamp is newly lighted as the steam condenses on the cold chimney ; and it can be seen running in drops out of the joints round the smoke-box door when a locomotive is first fired up, the cold iron having condensed the steam.

COMBUSTION OF CARBONS.

The carbon belonging to the hydro-carbon gas, and hat composing the solid part of the coal, unites with the oxygen of the air to form two compounds. If there is a free and full supply of oxygen, 12 parts by weight or one atom of the carbon unites with 32 parts by weight, or two atoms of oxygen, forming carbon dioxide, usually called carbonic acid ; but if the supply of air is so limited, that the hot carbon can not get hold of two atoms of oxygen, it combines with one atom, forming carbonic oxide.

When the carbon is raised to the temperature of ignition, the atoms appear to whirl round in search each of two partners of oxygen, and if the atom finds its two wives it marches through the tubes, giving out the maximum heating power. When the supply of air is so restricted that each atom cannot get two partners, they seize on one and pass onward, very weak. If the supply is not sufficient to give one oxygen partner to each of the carbon atoms, those that can get partners take them, and the remainder of the atoms pass over as crude gas that gives forth no heat except what has been stolen from the gases that entered into chemical union.

In the combustion of hydrogen, there is no second choice of union. If the oxygen supplied is insufficient to form the combination that produces water, part of the hydrogen unites with its full quota of oxygen and the remainder passes off unconsumed.

COAL GASES.

Coal contains small quantities of other substances besides carbon and hydrogen, that produce heat, but in considering the value of fuel the engineer is interested only in the heat obtained from carbon and hydrogen. When ordinary bituminous coal is subjected to heat a rather complex array of volatile constituents are driven off in the form of gas. It is very important that the elements forming the gas should receive sufficient oxygen to satisfy their affinities and prevent them from passing away unconsumed. Among the gases to be consumed are hydrogen, carburetted hydrogen, bi-carburetted hydrogen, carbonic oxide and small quantities of other elements. The greater part of the gas is generally composed of carburetted hydrogen, and if means be taken to supply it with sufficient oxygen while maintaining the temperature above the igniting point of hydrogen, there will be very little heat wasted. But, unfortunately, the dual conditions of supplying sufficient air to the top of fire, where the volatile gases must be consumed, and maintaining an igniting temperature, are seldom complied with, and the greater part of the carbureted hydrogen passes away unconsumed. Under these circumstances the volatile gases in coal are an actual loss, for heat has to be taken from the solid carbon to gasify them. Where a road finds it as cheap to burn coke as it is to burn bituminous coal, it may be concluded that the fire-boxes are so badly adapted to the burning of soft coal that the gases are wasted.

THE UNIT OF HEAT.

To estimate intelligently the value of different fuels, and for the purpose of measuring various heat operations, a thermal or heat unit has been established. The heat unit recognized by engineers and scientists in America, is the amount of heat required to raise the temperature of one pound of water one degree from 32 Fahrenheit.

HEAT LIBERATED IN COMBUSTION.

The operations of combustion represented by hydrogen combining with oxygen to form water, carbon combining with oxygen to form carbonic acid and to form carbonic oxide, have all very different thermal values, and the unit of heat enables us to calculate them so as to be easily understood. Carefully conducted laboratory experiments have demonstrated that one pound of gaseous hydrogen, on entering into combustion with eight pounds of oxygen, generates a quantity of heat equal to about 62,000 units. One pound of solid carbon combining with oxygen to form carbonic acid, generates about 14,500 heat units. One pound of solid carbon combining with oxygen to form carbonic oxide, generates about 4,500 units of heat. The difference between the heat obtained from carbonic acid and carbonic oxide, it will be observed, is very great. As careless firing is often the cause of large quantities of the gases evolved from the coal being carried through the tubes in the form of carbonic oxide, some conception of the loss entailed can easily be formed. Carbonic acid, with its 14,500 heat units, represents precisely the same quantity of coal as carbonic oxide, generating only 4,500 heat units. The only difference is in the quantity of oxygen taken up. Carbonic oxide may be formed in the burning coal for want of sufficient air, and yet be made to perform its proper share of heating if means are taken to supply it with oxygen before it enters the tubes. In that case it will take up enough oxygen to form carbonic acid.

One pound of carbureted hydrogen, when properly consumed, generates about 27,000 heat units. Oxygen combines with the hydrogen of the compound to form water, and with the gaseous carbon to form carbonic acid.

WHAT LABORATORY EXPERIMENTS TEACH.

These particulars represent laboratory measurements of the total heat belonging to the various gases, and the figures are far higher than the quantity of heat ever utilized in furnace or fire-box combustion ; but they represent accurately the relative value of the different products of combustion. While the conditions under which fuel is consumed in a locomotive fire-box are such, that considerable waste of heat is unavoidable, an intimate acquaintance with the thermal value of the various coal products, and of the operations attending combustion, ought to guide officers in charge of locomotives to regulate the appliances controlling the consumption of coal, so that the loss of heat will be reduced to its lowest possible point.

Practical men are very ready to undervalue laboratory experiments, and to class them all as fanciful theories unsuitable for ordinary work ; but the master mechanics of America, who are guiding their footsteps in the light of these so misrepresented fanciful experiments, are the men who are running their locomotives at the lowest cost for fuel. The theories of combustion, as taught in scientific books, are based on facts collected by patient experimenters trained by long years of diligent labor to read nature's revelations. The wise man accepts the truths so revealed and applies their teaching to the improvement of his work.

The Interior Finish of Passenger Cars.

[Paper read by Mr. T. F. Page, of the Laconia Car Company, before the Master Car Painters' Association, at Toronto, Can., Sept. 2, 1885.]

The subject which your committee has assigned me, asking for my practical views and experience, namely, "The inside finish of a passenger car from the foundation up," should be considered as a very important one.

Porous hard woods being most in use for this purpose, the need of some substance to fill up the pores to a level with the surrounding surface is felt, and the absorptive nature of the wood demands that it be liberally treated with liquids or glazed over with something that will prevent varnish from sinking into it, and also into the material with which the pores have been filled. After the wood has been well filled and absorption satisfied, there seems to remain no difficulty about obtaining a fine finish in any of the usual ways, with varnish, oil finish or shellac, either left with natural gloss, rubbed down to a dead luster or polished.

The true principle of finishing wood, it has been claimed, should be to obtain a smooth and level surface with the least possible amount of varnish or other substance which would build up a thickness on it, but it may be desirable in some cases to put a thickness on where much cleaning and scrubbing is to be done. In my own experience I have given the subject considerable thought, and have tried much in the way of experiment with the view of doing away with the necessity of rubbing down coats of varnish to get a level surface. There are some difficulties in the way of accomplishing this, some of which I will mention.

The pores being of various shapes and sizes, will take in and retain the filling more or less according as their forms may be adapted for it ; some are in the form of holes coming end to the surface, in which case they take and hold the filling very well, while others are long, trough-like and very shoal, where no amount of skill in the use of block, knife or rag can induce it to remain. In wiping off the surplus and cleaning up with a rag in the usual manner, the filling is necessarily lowered a little below the level of the wood, and while drying, the liquid portion of the filling is absorbed to a considerable extent by the wood, causing quite a shrinkage, so that by the time it is well dried we find, by a close examination, that the filling up of these pores has been so far only a partial success, and the grain of the wood has been raised up in places owing to the working in of the liquids between the fibres, necessitating the use of sandpaper, which will also remove more of the filling, and we have now so far quite an imperfect piece of work.

The nail holes (owing to their size and form) are still ready to absorb oil from putty, causing a shrinkage very noticeable, and in following up this filling and puttying with a coat of shellac, the alcohol partly dissolves and softens the filling so much that it does not regain its former worth.

I have given several of the advertised ready-mixed and patent fillers a fair trial, and have used many different substances and formulas of my own composition, and I am inclined to the opinion that a good filler should be composed of some material which is very soft and pliable, free from grit, however fine, not very quick-drying, but when thoroughly dry should be *very hard* ; indeed, hard enough to resist the action of a coat of alcoholic shellac, and tough enough to admit of a moderate use of fine sandpaper.

Whatever filling we use and however skillfully manipulated, there still remains one thing, which is as indispensable in this branch of car-work as in any other, and that is *time*.

Our superintendents and master mechanics have generally quite a correct idea of the necessity of drying the foundation coats of paint and the varnish, but who of us ever heard of one of those worthies being willing to encumber any part of the shop with a car for the reason that the filling was not yet hard enough to "go ahead" with the inside? A quick-drying filling containing much japan is no remedy for this, for it will not satisfy the suction of the wood. It is true that such a filling may close up and bridge over most of the pores, but anything which is put on afterward will sink into the wood and also into the dry material of which the filling may be composed.

To some extent the difficulties here mentioned can be overcome when *time and expense are allowed*, when these can be had I prefer a filling composed as here given : Equal parts best coach japan and raw oil, mixed to a thick paste with corn starch and as much litharge as can be used without discoloring the wood ; thin with spirits turpentine to a working consistency, and use on the same day of mixing.

After filling, comes the stopping of nail-holes. Make a putty with whiting, japan, varnish and just enough oil to prevent crumbling, and color to suit the wood ; leave it higher than the face of the wood, and when all is dried hard use block and sandpaper over the whole surface, cutting down the putty at the same time. On moldings and irregular surfaces leave the putty just flush when put in.

The sandpapering done, proceed to fill all again with filling mixed the same as before. This will be partially absorbed by the wood and will build on to the filling already in the pores, and will contain enough oil to restore the color to the putty, which, after having dried, was light-colored and dry in appearance, but after this second filling it cannot be seen, if matched to the color of the wood.

To darken light mahogany and cherry, bichromate of potash dissolved in water is excellent, and gives it the appearance of age.

The rubbing down of varnish and the so-called hard-oil finish has been done in car work considerably of late years, but does not appear to be much improvement over the same materials as the brush leaves them, certainly none in the matter of durability, and as for looks, a few months' wear reduces them to about the same general appearance.

Four or more coats of shellac, rubbed down to a fine finish, looks very nice when just out from the shop, but soon deadens and looks dull and dry, and seems to fail in properly protecting the wood around the doors and windows where frost and moisture have a chance to act.

Close-grained woods, such as cherry and maple, although somewhat porous, can be brought to a fine finish without any filler, except to saturate the wood with a mixture of oil, japan and spirits, after which proceed in the same manner as with those woods which had their pores stuffed with filling.

Wood ceilings seem to call for about the same treatment as the sides of the car, although it may be questionable whether a varnish gloss gives the general satisfaction that a dead finish does. As for decorating the ceiling, I know of no prevailing style or tendency to change, except to use less or none at all. Many people consider it unpleasant to have the attention riveted to some example of decorative skill while traveling in a railway car, and to place that example overhead may increase those feelings to quite a degree of uneasiness. A ceiling composed of handsome grained wood with fluted moldings over the joints, and rosette corners, set off with expensive lamps and bell-cord hangers, is quite tasty of itself, certainly about as attractive as the sides of the car, where it is never thought necessary to trace any ornament in common first-class passenger cars.

I think it desirable that the subject of filling and finishing hard woods be taken up at this meeting, and if what little I have written should be taken as a commencement which will lead to a general discussion, hen my object is attained.

Development of the Radial Valve Gear.

The following paper on this subject (illustrated by the accompanying engravings) was read by Mr. Otto Grüninger, of New York, before the Railway Master Mechanics' Association at its recent annual convention in Washington, D. C.

More than a generation has passed since the Stephenson link made its first appearance. It was immediately followed by the modification of Gooch, and later on by that of Allan, and these three designs, so vastly superior to the systems previously in use, quickly superseded them, and they still domineer. Age did not detract any thing from their excellent qualities. According to the dictations of circumstances, real or imaginary difficulties in manufacture, one or the other is selected, and they all seem to keep well abreast in the general run of modern locomotive practice. Time has added the nimbus of venerable respectability, and nothing short of the most eminent qualities could enter into a successful competition. Attempts have been made in such a direction, even at very early dates, and there is especially one system which to the present day enjoys a localized reputation. I refer to the Walschaerts motion, which is principally used in Belgium and some parts of France and Germany.

More recently a far more serious competition presented itself in a gear working entirely without any eccentrics whatever, and which even discards the time-honored link. This gear, the invention of Mr. Chas. Brown, formerly manager of the Swiss Locomotive and Engine Works at Winterthur, but now engaged in the erection and subsequently to have the management of most extensive steel-works in the south of Italy—an offshoot of Sir Wm. Armstrong, Mitchell & Co.'s works in Newcastle-on-Tyne—I wish to present to your honorable body in some of its characteristic forms. Mr. Brown has himself made over 600 applications of his gear. It is daily gaining in importance through its perfect working and the simplicity of its design, and I may safely say that the general recognition of its merits is merely a matter of getting personally and practically an insight into its operation.

I have here a number of blue-prints of the Swiss Locomotive Works, all of forms that were actually built. These may be inspected afterward. For the better demonstration of the underlying principle, I have prepared a series of skeleton sketches; these, however, are merely for the purpose of showing clearly the elementary parts, and they possess no claims to accurate proportions.

In one of the forms of Mr. Brown's gear, many of you, no doubt, will recognize at once a motion of which much has been said and written of late, though passing under a different name. The more so, I think, there will be felt a general interest to learn something of its origin, and of the principle upon which it rests. This brings me back to a reversing valve motion which was originally patented in France somewhere between 1840 and 1850. It was reinvented and patented in England in 1859, by John Wesley Hackworth, the eminent engineer, whose name and that of his father are so closely associated with the development of the locomotive engine.

Hackworth appears to have been the first to bring it into permanent use, and the gear has been named after him.

In this gear there is *one* eccentric only for the cylinder. The free end B of the eccentric rod A B (Fig. 1) is made to move in a straight line, and at about one-third from the end B, the valve rod is attached at C. As the point A revolves about the center O, the point of attachment C describes a sort of elliptic path. On varying angularly the straight course of the point B, the point C still describes an elliptic figure, but with its main axis more or less inclined according to the degree of angular variation in the course of B. The diagram shows the elliptic path of C, first for a sliding motion of B, which coincides with the central line X X O, and then for an inclined direction X X. For same direction X X, the large axis of the elliptic figure would be similarly inclined.

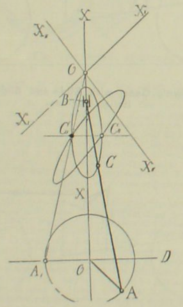


Fig. 1.—The Hackworth Gear.

This property in the motion of the point C can be utilized in moving a valve, and this is what Hackworth has done. He placed the crank opposite to the eccentricity O A, in the direction O D, or in other words he placed the eccentric at an angular advance of 90°. The greater the inclination of the large axis of the elliptic figure, the greater will also be the throw of the valve, and the change of the inclination of X X will therefore be the means of obtaining varying throws, that is, varying expansions. If X X is turned to the left of the central line X O into same position X X, then the motion of the engine will be reversed. For the central position of X X or mid-gear, the throw of the valve is the smallest, and its amount, the small axis C C of the elliptic figure, must be equal to the sum of lap and load.

The fulcrum O, around which the line XX is turned, is of great importance for a correct action of the valve. It is chosen so that whenever the crank is on one of its centers, B, the end of the connecting rod, occupies just that fulcrum. Hence, no matter what inclination the line X X will be brought to, or whatever degree of expansion is carried, whenever the crank is at its centers, the valve will invariably have returned to one and the same position for all points of the fore and back gear, or in other words, the load will be constant.

In the practical application of his reversing gear Mr. Hackworth adopted various modifications of detail. He generally employed a slot and sliding-block for guiding the end of the eccentric-rod, but he also used sometimes a radius-rod parallel motion. This gear has been adapted in many instances to marine engines. The patent specification also shows an application for locomotives, but it does not appear that this idea was ever carried to practical execution.

Excellent as the gear is for reversing purposes it has one great disadvantage. For a larger traverse or throw of the valve it is necessary to give to X X very large angular distances from the center line—and this is inconsistent with an easy working of the slide—or the throw of the eccentric must be made disproportionately large.

Mr. Brown applied the Hackworth gear in 1867 to a marine engine. He found that the oscillating motion of the valve rod around the point of attachment to the valve stem, produced a sensible error in the motion of the valve, and in order to correct the error he substituted a curved slot for the straight one of Mr. Hackworth.

Subsequently he attempted to do away with the eccentric altogether, and finally, by taking the motion from some point of the connecting rod between cross-head and crank pin, but retaining Hackworth's rectilinear, or rather corrected curved slide motion, Mr. Brown succeeded in perfecting and producing his present gear. His German patent dates July 28, 1877; his English patent was filed on Aug. 24 of the same year, and it was issued April 9, 1878. Since then, as already stated, Mr. Brown himself has made over 600 different applications, mostly on smaller locomotives, but also on engines of all types.

In order to thoroughly illustrate Mr. Brown's gear, I first introduce a skeleton drawing after his German and English specifications. You will recognize in Figs. 2 and 2a the rod A B, with the point C in which the valve rod is attached. You will also recognize the course X X of the point C, also the fulcrum O of this course. But the point A is actuated in an essentially different manner. A swinging link O S is connected at S to some point of the connecting rod, and at Q to a radius bar Q F, oscillating about the fixed center F. The rod A B is now attached to a point A on the swinging link Q S.

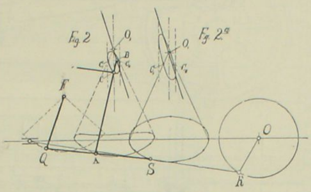


Fig. 2 2a.—Brown's Gear.

Following the point S of the connecting rod during one revolution of the crank we will observe that it describes a kind of elliptic curve. The nearer S is approached to the caank pin, the more will the curve approach the form of a true circle, and the nearer S is taken to the cross-head the more will this curve approach the form of a straight line. If the end A of the pendulum lever A B, as we may appropriately call this rod, would be attached directly to the point S, then the point C would also move in an elliptic path, similarly as in the Hackworth gear, but this motion would be unfit for valve purposes. I have shown this condition in Fig. 2a, and you will observe how unequally the throw of the valve would be to either side of the central line. Mr. Brown has remedied this defect by the above lever connections. The point A of the pendulum lever is made to describe a curve which might be likened to an elliptic figure more or less collapsed on its upper side, and the proportions and dimensions of the levers are chosen in such a manner as to give an equal throw of the valve to both sides of the central line.

The system of levers is further so arranged that whenever the crank is on its centers, then the point B of the pendulum lever also coincides with the fulcrum O of the path X X. This insures again a constant lead for all points in fore and back gear.

I have now to describe the method by which the point B of the pendulum lever is guided in its path X X. I exhibit here in Fig. 3 and 3a a skeleton drawing from a blue-print of the Swiss Locomotive Works. It represents the general disposition of the engine gear of a chain locomotive with vertical cylinders of the year 1877.

The different elements of the valve-gear are easily discerned. We have again the pendulum lever A B, in this case prolonged beyond B, and the point C at the end of the prolongation, where the valve-rod is attached to. The point B is in this instance guided by a curved slot, which can be turned around the fulcrum O; p q is the reversing rod. The curvature of the slot corrects the disturbing influence of the vertical oscillations of the valve-rod. I think the gentlemen will already have discovered that this is exactly the gear which, two years afterward, in 1879, was patented in England by Mr. Joy.

In the ordinary link gear the motion of the slide block is altogether localized and is only very small for the different points of the gear; here, however, an entirely different task is assigned to the slide block. During each revolution of the driving shaft, and scarcely affected by the degree of expansion, it has to sweep the entire link to and fro. Mr. Brown soon found out that for locomotives the block and slide would wear rapidly, and, unless the roadbed was exceptionally free from dust or sand, this mechanism would form a constant source of trouble. In the above chain locomotive however, the engines are entirely inclosed and worked through chains to the drivers.

He then designed the following system of compounded radius bars, which, after years of application and under the worst conditions of road-bed, left nothing to be desired: In Fig. 4 n p s is a double bell crank on the reversing shaft O; X X is the prescribed path of the end B of the pendulum lever A B. C is again the point of attachment of the valve rod. A radius bar n m vibrates around the point n. In m a second vibrating link B t is attached, oscillating around the point s, but at the same time having a rectilinear sliding motion through the same. B is the point of attachment of the pendulum lever. It will be noticed that as m approaches its central position the angle n m B diminishes, and B is made to approach the point n—that is, move in that direction. The point B, therefore, describes a certain curved line X X, and the amount of curvature, commencing with an almost straight line, can be controlled within all practical limits by the proportionate dimensions of the compounded radius bars.

The principal thrust from the valve-rod is taken up by the radius bar n m, and but a comparatively slight portion is thrown upon the swivel joint s. Experience has sufficiently demonstrated that the wear at that point is very slight. This ingenious device of compounded radius bars admits of a very compact and neat construction; it gives complete control over the curvature of X X, and, on account of this, over a perfect motion of the valve.

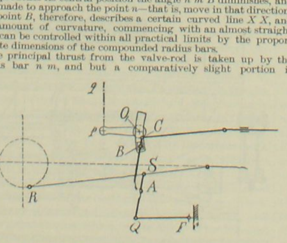


Fig. 3.—Brown's Gear, with Slide and Slide Block as applied in 1877.

The most carefully constructed type of Mr. Brown's gear is that of Fig. 5, representing the gear of engines of the Toossthal Railway in Switzerland. The engines were built in 1884. They were in every respect a first-rate job, especially for local trains running at a high speed. They exhibit remarkable steadiness owing to the use of the rocker.

The end of the connecting rod, attached to the rocker, has to move through part of a circle, and for this reason, a point A of the rod already described an elliptical figure sufficiently flattened on its upper side to make any further correction unnecessary and to admit of the direct attachment of the pendulum lever to the connecting rod. This makes the gear very simple and it produces an almost mathematically correct valve motion.

A number of engines were built for Italy in 1882. Figs. 6 and 6a, shows the general disposition of the gear. At the special request of the master mechanic of the line, Mr. Brown had to use the slide block and grooved link. The simultaneous employment of the rocker made the valve gear very simple and acceptable to the eye, but the subsequent wear proved to be very great.

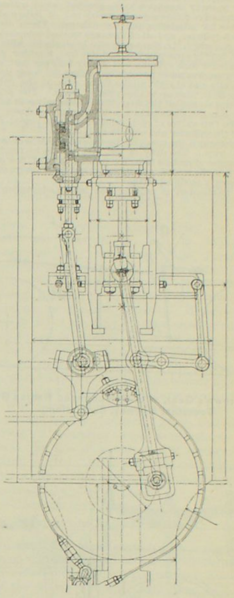


Fig. 3a.—Elevation of Brown's Gear, 1877.

I may mention here that in a very recent design of a small engine without rocker, Mr. Brown connected the lower end of the pendulum lever directly with the coupling bar, instead of with the connecting rod. The general arrangement of the engine allowed this design. It produced a valve gear of extreme simplicity.

Figs. 7 and 8 show Mr. Brown's versatility in the application of the leading idea of his gear. Fig. 7 was designed in 1879, and represents the gear of engines built for Rappottsweil; Fig. 8 dates from 1881, and the engines were built for Muhlhausen. Both types had rockers. The valve-rods have a rectilinear motion only, and they receive it in a manner quite analogous to the Walschaerts gear; with the essential difference, however, that the eccentric of the latter has been substituted by Mr. Brown's connection with the connecting rod. This type with short radius bars may be somewhat simpler in appearance than the system of compounded radius bars; but it is not so easy to handle with the reserving lever, indicating that there are severe strains present due to the shortness of the radius bars.

Taking all together, the gears with compounded radius bars, notwithstanding a little extra complication, are to be preferred, as easy handling and reduction of strains on the valve gears are matters of prime importance.

When comparing Mr. Brown's gear with the present different link motions, the first question that will arise concerns the distribution of steam. And in this respect it may be said that it combines all the virtues of the best gears in use. It has a constant lead like that of Gooch or Walschaerts, and allows the greatest ranges of expansion with a correctness in action that is only obtained in the best of the other designs. Its manufacture is simpler and cheaper, and in discarding with the eccentrics, and by producing all rotations around pins of very small diameters, a considerable source of frictional losses is abolished. It has been tried severely on a large number of tramway engines, street dummies and locomotives running on dusty, sandy tracks, and it has done excellent service under circumstances where eccentrics have given a great deal of trouble. Its wear is inconsiderable, but when worn a few bushings will set all right.

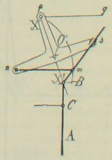


Fig. 4.—Brown's Compounded Radius Bars.

I am passing now to a new valve motion, the design of Mr. Geo. S. Strong, of Philadelphia, which in many important respects radically deviates from usual custom. Mr. Strong has made valve motion in its application to locomotives a special study. In carrying out his present designs, he was principally actuated by the idea of producing a gear which, under almost any conditions of speed, would practically give uniformity between boiler and admission pressure; that is, do away with wire-drawing, and also reduce back pressure to the lowest possible point. But besides these considerations there were to be observed the imperative demands for easy working, slight wear and security against de angements, as well as facility in manufacturing.

To lessen wire-drawing, we must have large port areas and a rapid opening and closing of the valves; and to reduce back pressure, especially at the early points of cut-off, we must also separate the function of exhausting from that which governs the admission of steam.

To obtain large port areas Mr. Strong applies gridiron slides, and in order to carry expansion to the greatest extent without involving an excessive compression he makes use of independently worked valves for admission and for exhaust. There are two valves to each cylinder, and all of them are worked independently.

The port area which Mr. Strong obtains in an engine with 19 × 24 cylinders, is *fifty* square inches, and this feat, together with a total clearance for each cylinder end of only four per cent. of the cylinder volume, was made possible by placing the long gridiron valves vertically and at right angles to the axis of the cylinder, and bringing them close up to the cylinder walls. The arrangement resembles somewhat the disposition of the valves in a Corliss engine; but here the slides have a rectilinear up and down movement, and the two valves of each cylinder end are placed on the same side of the cylinder and close to each other.

Their movement is the result of the combined action of two distinct mechanisms. The duty of the first one is to receive the primary impulse of motion from the running gear of the engine, and impart it to the second mechanism, a system of levers or rockers, in a properly modified form.

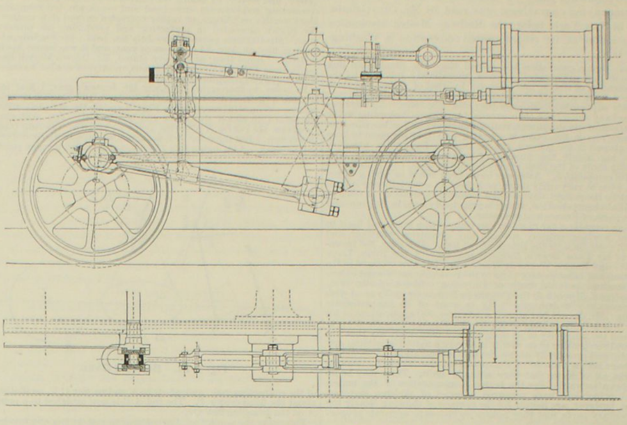


Fig. 6a.—Elevation and Plan of Brown's Gear for Italian Engines.

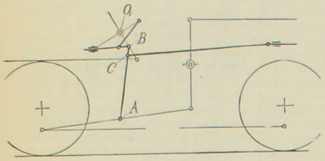


Fig. 5.—Brown's Gear, with Compounded Radius Bars for Toessthal Railway, Switzerland.

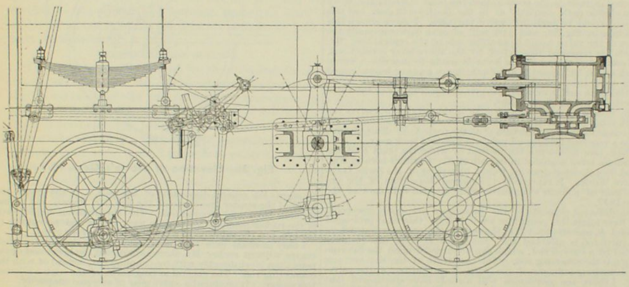


Fig. 5a.—Brown's Gear—Engines for Toessthal Railway.

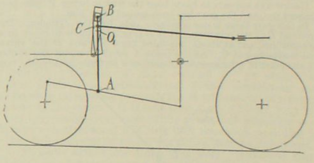


Fig. 6.—Brown's Gear, with Slide and Slide Block for Italian Engines.

The first mechanism is nothing else but an adaptation of the Brown gear. Instead of using Mr. Brown's compounded radius bars, Mr. Strong substituted one single radius bar, the fulcrum of which is located on a block which, by sliding on a fixed quadrant, can be brought into the different positions of fore and back gear. This block, properly called a thrust-block, takes up the thrust of the valve rod, and if its position on the quadrant is to be changed, only the frictional resistance of the block, and whatever tangential component of the thrust that exists, have to be overcome. This gear admits of very easy handling. An engine with 160 pounds of steam can be reversed with full steam on with one hand.

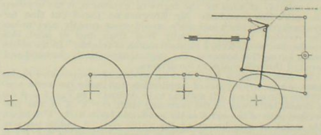


Fig. 8.—Variation of Brown's Gear—Engines for Muhlhausen.

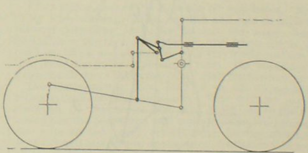


Fig. 7.—Variation of Brown's Gear—Engines for Rappoltsweil.

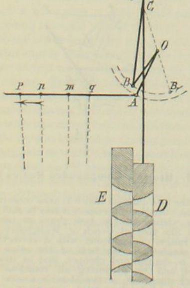


Fig. 9.—Strong's Patent Valve Gear.

Where the general disposition of the engine will admit of a single radius bar of sufficient length—a condition not always readily fulfilled, when the valve is to be worked *directly* from the pendulum lever—this device may be employed; while, as I pointed out before, Brown's compounded radius bars always give complete control over the curvature of the path *X X*. In Mr. Strong's case, where there exists a system of rockers to modify the motion before it reaches the valves, any shortcomings in the distribution of steam that may result from too short a radius bar, can be corrected by proper dimensions of the rockers.

The motion, when it reaches the rockers, is similar to that of an ordinary slide valve. Fig. 9 will illustrate how essentially they modify it. *E* is the valve seat, and *D* the valve. The motion from the Brown gear is communicated to a lever or rocker *O A*, which imparts it to a second lever *O B* on the inside of the

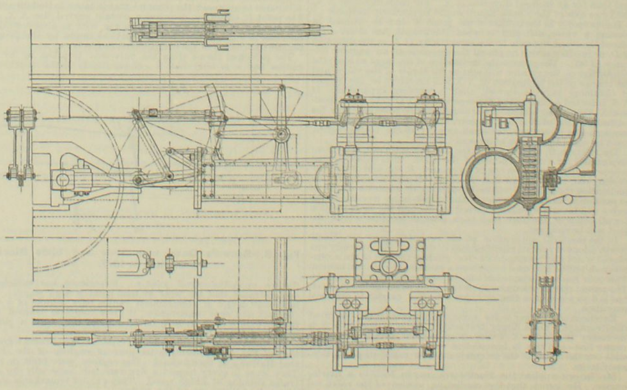


Fig. 9a.—Strong's Patent Valve Gear and Valves—Elevation and Plan.

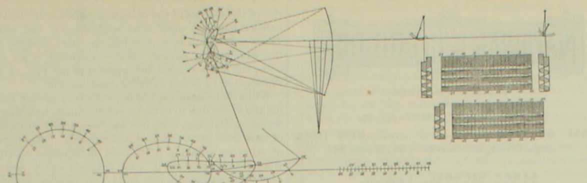


Fig. 9b.–Strong's Patent Valve Gear and Valves–General Disposition.

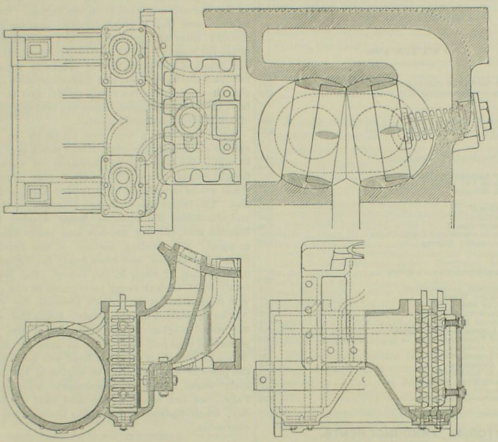


Fig. 9c.–Details of Strong's Patent Valves. Showing Valve Seats, etc.

steam space. A link *B C* connects the lever *O B* with the valve. The figure shows the moment where the crank-pin is on its center; the valve has opened the port by the amount of lead, and the position of *A* corresponds to the position *n* of a point of the outside valve rod; *n m* is the distance the valve rod has to travel in mid-gear, and with a direct connection to an ordinary slide valve, *n m* would be equal to the sum of lap and lead; *n q* represents the total traverse of the valve rod when in full gear. As *n* continues its motion in the direction of *n p*, it will be seen from the position of *O B* and *B C* that the valve is made to open rapidly, as it also will close rapidly when returning to its present position.

But, in returning, the more the point *B* approaches the point *B*—this latter point being defined by the condition that a straight line *B O C* be equal to the length *B C*—the slower will be the motion of the valve, and for a perceptible distance to either side of *B* the valve will appear to be almost at a stand-still.

This peculiarity has been utilized by Mr. Strong in the motion of the four valves. Each one has its special set of rockers, and they are so arranged that while one of the admission slides is opening rapidly, the other one, having covered its lap, is almost at rest. The motion is also so timed that the valve does not commence to open again until its has compression under it, which balances it to a great extent, and the valve will therefore move with very little friction. While the outside valve rod has a total travel of 4 inches, the gridiron slides travel only $1\frac{1}{16}$ of an inch, and at an early cut-off this is reduced by about one half.

The movement of the exhaust valves are correspondingly timed so as to open quickly within the last inch of piston travel, when the pressure in the cylinder is already reduced. The frictional losses therefore will also here be very small.

The motion of the steam and exhaust slides being entirely independent, the exhaust slides work full stroke at all points of cut-off, causing free exhaust, late closure and little compression, just enough to give a sufficient cushion for perfect smoothness of running at any speed. As the exhaust valves do not open until within the last inch of piston travel, the steam is practically expanded to the end of stroke, and on account of the independence of the valves, steam may be admitted from three to twenty inches, giving a large ratio of expansion and a very powerful engine for starting.

The construction of the boiler in Mr. Strong's engine is such as not to require a strong blast; a large nozzle is therefore used which reduces back pressure to the lowest limit. With the large port areas, together with the rapid action of the valves, admission pressure is carried within one or two pounds of boiler pressure, and it is carried out to the point of cut-off without anything like the loss experienced with an ordinary valve.

The peculiar intermittent motion of the gridiron slides—similar in effect to the action of cams and tappets—takes the wear from them, and it affords the best balance possible without any balancing device. I may mention that valves constructed on this principle, but operated by cams, have been at work for twenty years night and day, and they are as tight now as when started.

There is no steam chest on the cylinders. The valves are interposed in the passages, and the passages are very large, affording a free steam supply and a free exhaust. Concerning weight, the cylinders on a 19 × 24 engine are 800 pounds lighter than those of the regular type with chest and ordinary valves. And with regard to manufacture, the valve seats are introduced by boring entirely. Planing and slotting are done away with, except the planing for the frames, saddles and truck centers. The cost of cylinders and valve gear, with equal facilities, can be reduced below the cost of the ordinary link motion and ordinary cylinders, and the former will wear far better than the latter.

Uniformity of detail and standard sizes are aimed at in all branches of practical railroad operation. To think of general standard sizes with such a complicated mechanism as we have in our engines, seems almost to border on the ridiculous, and yet with Mr. Strong's gear, two standard sizes would answer for all classes of locomotives, one for four, and another one for six, eight and ten couplers. Every thing might be reduced to a few standard parts. Drop-forgings to standard dies, and finishing limited to working faces, would most essentially simplify manufacture and cost.

The Car-Building Outlook.

Judging from present indications, car-building will be much more active this fall than it has been at any time since the existing depression was entered upon. Western railway managements alone have made known wants of some 4,000 freight cars, and it is not improbable that this number will be doubled before the season is far advanced. For, of the contemplated accessions to rolling stock it is to be noticed that they are confined to a class of roads whose equipments are already distinctly above the average. Those lines whose rolling stock has been allowed to deteriorate most have not as yet been heard from officially; and this circumstance, considered in connection with inquiries already in hand, affords car-builders a degree of comfort which is the more appreciated because of its newness.

In this vicinity the St. Charles Car Works were the first recipients of a contract for the fall trade. This was from the Kansas City, Fort Scott & Gulf Railway for 300 freight cars, and has already been completed in part, if not in whole. The next contract heard of as having been placed was the one recently awarded the Litchfield (Ill.) Car Company by the Missouri, Iowa & Nebraska Railway for 200 box, 100 stock and 100 flat cars. Another contract of recent placing was that of the Union Pacific for 500 freight cars, divided between the Indianapolis and the Peninsula (Detroit) Car Companies in the ratio of three to two in favor of the latter. The Missouri Car & Foundry Company, of this city, have been credited by the rumor with having 200 new cars to construct, but the information seems to be in the nature of news to them.

But it is the inquiries rather than the orders now booked that have inspired the car-builders with new hope. These are from some of the principal roads of the country, and will be awarded in part within a few days. The Missouri Pacific contract, more particularly, is expected to be placed at an early date. This will be for 600 freight cars. Inquiries, the outcome of which is less certain, embrace invitations for bids from the Mobile & Ohio for 500, and from the Chicago, Burlington & Quincy for 1,800 cars.

The asking of the last-named road for bids for so large a number of cars is looked upon by car-builders as rather significant, and it is doubtful if they will be disposed to assume the risks in which the terms of the proposed contract would involve them. For it would appear that the cars are mostly for next year's delivery. Naturally car works proprietors are afraid that in the interval between the acceptance and completion of the contract, wood and iron may advance in price and the venture end in disaster. In fact, it is generally surmised that the reason of the road's management in asking for bids of so large a contract is that they are apprehensive of an advance in prices of car material.—*Age of Steel, Aug. 29.*

Outlining Color Ornaments.

A knowledge of the elementary principles bearing on the relations of colors is of importance in determining the best color or tint for bordering lines with reference to the hues of ornaments and their grounds. The chromatic advantages arising from outlining figures are frequently very great. The eye is aided by outlines in tracing the form of the ornament. By their interposition the difference between contiguous colors is increased, particularly if the hues of the ground are allied to those of the ornament. A border frequently dissipates optical illusions by preventing kindred colors being blurred or running into each other. Outlined borders thus supply definiteness to contiguous colors. When there is a decided contrast between the colors, borders may be dispensed with, and thus it is that in Pompeian mural decorations they are absent, the Pompeian painters, however, surrounding the general surface decorated with borders of greater richness. In the case of two full colors of different hues, adjoining each other, outlined borders are an absolute necessity. When designs are executed in relief the lights and shadows produced are sufficient to act as outlines, but in flat-painted ornaments the case is different, owing to the influence of one hue on another. Thus fine red lines on a blue ground will create a purplish tinge, but with a white outline this will disappear, and the difference between the two hues will be increased. Where dark outlines are introduced the colors themselves are apparently darkened. Black and white have the power of separating colors so completely that each appears in the hue it would show if seen by itself upon a neutral ground. Black and blue are admirably separated by a white outline, whichever of these may constitute the ground.—*Painters' Magazine.*

Improvement in Railway Stations.

The improvement which has recently been made in the construction of railway stations in this part of the country has not received the public commendation it deserves. A number of the railway companies that have their termini in Boston have lately built stations along their lines that are decided ornaments to the towns in which they are located. Until recently, a country or suburban station has been about the most disagreeable feature in the place in which it has been located. It has been architecturally ugly and thoroughly inconvenient, while the ground around it has been maintained in almost careful disorder. In this respect, American railway stations have been in striking contrast with the railroad stations in Europe, which are ordinarily built with great taste, while the land in their immediate neighborhood is carefully laid out. The Boston & Albany, the Old Colony, and one or two other companies, seemed to have considered it expedient to copy this European model, and where new stations are built these have been constructed in a manner which can not be too much commended. The influence of a fine station, with the ground around it carefully laid out, can not fail to have its effect on the people of the town in which it is situated. Insensibly, the buildings in the vicinity will be improved, so as to bring them up to the level of the model of good taste that has been set, and by this simple means an object lesson of the greatest value will be taught in many different localities. Even on the score of utility, not a little can be said in favor of this new departure, for any thing which tends to make railway travel easier and more attractive, tends also to increase the patronage of the railroad companies. — *Boston Herald.*

Classification of Locomotives.

Mr. A. B. Underhill, Superintendent of the Boston & Albany road, has compiled a small classification handbook containing useful particulars in respect to the locomotives belonging to that road, of which there are 247 in all. Of these, 199 were built by the company, 22 at the Rhode Island, 14 at the Hinkley and 12 at the Mason Locomotive Works. Among these engines there is an unusual diversity of cylinder dimensions; 36 have 16 × 26 inch cylinders; 30 have 18 × 22; 27, 18 × 26; 23, 16 × 22; 18, 17 × 26; 15, 14 × 24; 14, 17 × 24; 12, 20 × 26; 8, 18¾ × 28; 7, 15 × 22; 7, 14 × 22; 6, 18 × 24; 5, 16 × 24; 5, 17 × 22; 4, 16¾ × 22; 1, 17¾ × 22; and the cylinder dimensions of one engine are not given.

Judging from the way the numbers run, we conclude that most of the short-stroke engines have been built within the last ten years. Although all the divisions of the road except the first are very heavy to operate, 11 loaded cars being a full load to a 16 × 26 five-feet wheel engine, there are only 18 six-wheeled coupled engines among the whole number belonging to the company, all the others having four drivers coupled. The six-coupled engines are not rated any higher for loads than the four-coupled of the same cylinder capacity. An automatic traction-increaser is fitted on most of the eight-wheel engines. Fifty-seven of the engines are rated for passenger service; 65 engines have the automatic brake, and 14 have driver-brakes, the latter being mostly switching engines.

How They Do it in Australia.

There is an anomalous way of managing the railway, machinery department of some of the Australian colonies that produces a great deal of discord. The railways there are controlled and operated by the Colonial Government, but the chief locomotive engineer, as the superintendent of motive power is called, is appointed by the governor, who is usually an Englishman and appoints an English engineer to that position. The locomotive engineer, being brought up on some English road is generally prejudiced in favor of English machinery and English methods of operating. The colonists, on the other hand, have found that American railroad machinery is much better adapted to their indifferently constructed roads than are English locomotives and cars, and as they have to pay for the rolling stock, they order it wherever they please. They frequently order locomotives and cars from American makers, a practice which seems very objectionable to the locomotive engineers. There was lately quite a conflict between the Minister of Public Works of New South Wales and the locomotive engineer of the South Australian Railway, arising out of an order given to an American firm to build 200 dump cars for the road. The dumping arrangement did not work satisfactorily, and the locomotive engineer, although aware that there was a defect in the mechanism in a specimen car that was built, appears to have let it pass. Our English contemporaries appear to think the locomotive engineer was badly used because his omission was questioned by the Colonial Government.

The Philadelphia Novelties Exhibition.

Like all exhibitions under the management of the Franklin Institute, the Novelties Exhibition promises to be a financial success, a result which can only be achieved by making an attractive display. There are many novel, interesting and pretty exhibits, but the visitor who goes to look for novelties belonging to railroad equipment is certain to be disappointed.

There are several systems of improvements in gas-lighting exhibited that produce jets rivaling in brightness the electric arc light, and it seems that they would be a most desirable light to introduce into passenger cars if they could be applied to that purpose conveniently, for the existing methods of lighting leaves much more light to be desired. Inventors and makers of car equipment have patronized this exhibition very lightly, for there is scarcely a car appliance in it. The Curtis & Wood car coupler is represented by a model, and there are some inside furnishings displayed, but nothing more in this line to attract interest.

Locomotives, or their attachments rather, are better represented. The Sellers new fixed nozzle automatic injector, which is attached to a Harrison boiler, attracts considerable attention among railroad men, who are interested in its peculiarity of adjusting itself and going to work again after breaking. An injector exhibited by the Rue Manufacturing Co., which is called the "Paradox," also has this peculiarity of starting after breaking without requiring to be manipulated. That a capability of this kind is regarded as important, is evidenced by the interest locomotive men take in these two injectors.

William Sellers & Co. have the best display of machine tools in the building, yet their exhibit is small. Their double-headed axle-lathe is there, also a wheel-boring machine, both of which have been illustrated in the CAR-BUILDER. They have also an engine lathe, a planer, a twist drill grinder and pointer, and a good collection of their injectors. Tallman & McFadden exhibit a few machine tools. The Rue Manufacturing Company have a good collection of their injectors, and J. E. Lonergan & Co. have a fair assortment of their oil cups.

The Baldwin Locomotive Works built one of the boilers which supplies steam for the engines running the machinery. It is of the tubular type, designed by William Barnet Le Van. The shell is made telescopic, and is formed of three single plates of steel. The boiler is 54 inches in diameter, and contains thirty-two tubes 4 inches in diameter. It is set 36 inches above the fire grates, which allows ample room for the gases to combine before entering the flues, so that perfect combustion of the coal is obtained. A mica-covered opening is provided in front of the furnace, and an observer can watch the operation going on within. A mixture of nut and slack anthracite coal is used, and it makes the boiler steam very well.

The managers of the Franklin Institute are using this exhibition to advance industrial education among the rising generation of Philadelphia, as is their way when any opportunity offers. There are a great many manufacturing operations going on within the building, and they are watched with keen interest by the numerous visitors.

The McKeen Coupler.

We are requested by Mr. McKeen to say, that his coupler having been shown automatically only at Buffalo, it is but just to note the following points and advantages which were not brought out in the trials:

1. It can be coupled from the lower to the higher car as well as from the higher to the lower, and could have been coupled with Janney or Cowell, or other vertical-plane coupler, by means of the link controller, without going between the cars.

2. It will prevent the bending and breaking of links, and also the bending and loss of pins.

3. It can be coupled and uncoupled on a curve of 50 degrees with the greatest ease.

It has been tried at Bethlehem on a curve of 50 degrees and the worst curve on the Lehigh Valley with success.

NATIONAL CAR BUILDER

PUBLISHED MONTHLY
BY
R. M. VAN ARSDALE.
MORSE BUILDING .... NEW YORK.
Chicago Office, 187 Dearborn St., Room 24.

JAMES GILLET, } Editors.
ANGUS SINCLAIR, }

OCTOBER, 1885.

Subscription.—$1.00 *a year for the United States and Canada; $1.50 a year to Foreign Countries embraced in Universal Postal Union*

CONTENTS.

ILLUSTRATIONS: Page.
Development of the Radial Valve Gear 133
Renaissance Exterior Decoration of Passenger Cars 139

COMMUNICATIONS:
Locomotive Fuel Economy 130
Rolling Stock, Past, Present and Prospective 130

EDITORIALS:
Better Lagging Needed for Locomotives 136
Class Cars 136
Best Material for Locomotive Fire-Boxes 137
Measuring Work by Car Miles 137
Large and Small Wheels 137
Car Seats 137
Better Times Ahead 138
Practical *vs.* Technical 138
Judging Locomotive Speed 138
Electric Lighting in Shops and Track-Yards 138
Inconvenient Terms and Names 139

MISCELLANEOUS:
Public Tests of Automatic Car Couplers 128
Shop Notes 129
Improving Compound Locomotives 131
Prevention of Flange Wear 131
British Railways in 1884 131
Largest Locomotive Nozzle in Use 131
Master Car-Painters' Association 131
Combustion in Locomotive Fire-Boxes 132
Interior Finish of Passenger Cars 132
The Car-Building Outlook 135
Classification of Locomotives 135
Outlining Color Ornaments 135
How They Do it in Australia 135
Improvement in Railway Stations 135
The McKeen Coupler 136
Philadelphia Novelties Exhibition 136

EDITORIAL ANNOUNCEMENTS.

Addresses.—*Business letters should be addressed, and drafts and money orders made payable, to* THE NATIONAL CAR-BUILDER. *Communications for the attention of the Editor should be addressed* EDITOR NATIONAL CAR-BUILDER.

Advertisements.—*Nothing will be inserted in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.*

Contributions.—*Articles relating to railway rolling stock, construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notices of changes in railroad officers, organizations and names of companies.*

Special Notice.—*As the* CAR-BUILDER *is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of each month.*

BETTER LAGGING NEEDED FOR LOCOMOTIVES.

In our last issue we gave some particulars of improvements in covering locomotive fire-boxes and boiler-heads, inaugurated by Mr. G. W. Stevens, Superintendent of Motive Power of the Lake Shore & Michigan Southern Railroad. This is a line of economy that has been greatly neglected in the construction of our locomotives, and there is good reason to believe that very substantial savings can be effected at little outlay, if better non-conductors were employed to prevent radiation of heat from various parts of the locomotive, including steam-chest and cylinders. The fact has been too often overlooked, that saturated steam is constantly at the dew point, where it has just passed from water into steam, and that any abstraction of heat by the cool metal of cylinders, turns part of the steam back into water, in which condition it is worthless as a transmitter of power.

During the course of a series of very accurately conducted tests, carried out several years ago by Mr. John E. Marten, Master Mechanic of the Chilian Talcahuano Railway, to ascertain the most economical dimensions of locomotives, some interesting facts were incidentally discovered about the effect of bad cylinder covering. The engine under trial had a diamond stack and netting. The cone was perforated with small holes to enable the engine to raise steam more readily. The engine continually threw drops of water out of the stack when at work, a very common thing with locomotives having diamond stacks. From this it was inferred that the condensed steam lodged in the steam and exhaust passages. The cone and netting were removed, and it was found that the drops of water were decreased in quantity, because the free exhaust permitted them to be thrown high into the air. After several other efforts were made to prevent the water-throwing, hair felt was applied as a covering to the cylinders, and the cavities of the saddles of the cylinders between the steam and exhaust passages were filled with cement and sawdust. This was found to be a great improvement, and the water-throwing almost ceased. Water-throwing is an annoyance, but it is a small evil compared to the loss of power represented by lavish cylinder condensation.

While little attention has been directed toward restraining the losses due to cylinder condensation resulting from defective covering, even less has been done to prevent loss of heat from fire-boxes and boiler-heads. The hurricane of wind in which a high-speed locomotive continually works, forces cold air to pass through every crevice in coverings, and where the wind can impinge on the hot sheets, it acts the part of an air condenser, carrying away enormous quantities of heat that must be provided for by increased consumption of coal. On a cold winter day, when a locomotive goes slowly past the platform of a station, the passengers within ten or twelve feet can feel the genial warmth imparted from the engine. So every locomotive acts like a great furnace passing through the country, transferring a large part of its heat to the atmosphere for want of proper covering to prevent the diffusion. The result of this great loss of steam is apparent on all railroads during winter, and finds expression in complaints that the engines did not steam freely, and in requests to have the nozzles reduced, when the real trouble is that the steam is being profusely wasted.

Some years ago, a test was made by an enterprising master mechanic, to ascertain how much coal was required to supply the heat lost by radiation on a calm day. A freight engine was selected, and it was placed on a side track where it had not to be moved during the period of test. The boiler was 51 inches diameter, with wagon top and one dome, the covering being wooden lagging and Russian iron, sides of fire-box and boiler-head being bare as usual. The heating surface of the fire-box was 97.5 feet, tubes 826 feet, and when ready for the test there were 8,500 pounds of water in the boiler. The boiler was perfectly tight, no leak being perceptible in any part. Steam was maintained at 80 pounds pressure for twelve hours. At the expiration of the twelve hours the water was at the same level as at the beginning of the test, and 300 pounds of coal had been used in keeping up the steam. When 25 pounds of coal an hour was used up to supply the place of lost heat with an engine at rest on a moderately warm day—the atmospheric temperature was 50 Fahr.—we can easily understand that the loss on a cold day, when the engine is rushing through the air, must be enormous.

CLASS CARS.

As compared with the prevailing system of class cars in Europe, the American system, or practice rather, presents a strong contrast, and suggests the inquiry whether this contrast will not in time virtually disappear in consequence of changes in either system demanded by the interests of railroads and their patrons. The popular impression in this country is, that class cars in the European sense are a natural outgrowth of monarchical governments, and are rendered necessary in order to mark the distinction between the privileged classes and common people. This impression is evidently a mistake. The running of class cars as public conveyances on European roads, is not a compulsory matter with which governments have any thing to do, any more than the running of sleeping, parlor or emigrant cars is in this country. It is entirely discretionary with the railroad companies, which are organized there and every where else for the purpose of making money. It is for their interest to carry as many passengers as possible, without regard to their social or political status, at rates that will yield a profit, and if the profit can be increased by carrying a greater number of people, and this greater number can be obtained by the running of different classes of cars in the same trains, at different rates of fare corresponding with the quality of the cars, it would certainly be stupid and short-sighted management not to do it. The resulting benefit would be mutual, as between the roads and the people who traveled, and it would be no more of a class distinction for the latter to distribute themselves in these vehicles according to their ability or inclination to pay the different class rates, than it would be for the same persons to put up at so many first, second or third-class hotels.

On American railroads, very little has yet been done to favor this natural classifying process, although the distinctions between rich and poor, vulgar and refined, the unsavory and clean, exist here as rigorously and as unavoidably as any where else, and in the relations of business they have got to be dealt with as such. All passenger cars on our roads, other than parlor, sleeping and emigrant cars, are first-class. At any rate, they are never called second-class. Emigrant cars are for emigrants, and not for the masses who would like to travel at reduced rates, even if the cars were not bedizened with a profusion of costly ornamentation. Parlor and sleeping cars are special accommodations peculiarly American, and may be classified or regarded as a class above the first-class or the so-called ordinary coaches. Every person who pays regular fare has access to these coaches, and people are thus thrown promiscuously together when many of them would prefer to sort themselves so far as they can do so by paying different fares. This is manifest from the alleged fact that tickets at reduced rates are sold over through routes, the holders of them riding in the same cars with the mass of passengers who have paid the regular and higher rates, thus carrying two classes of people (in the European railway meaning of the term) in the same car, and practising an imposition upon the class that pays full fares. The profits derived from passenger traffic, whether carried on with class cars or otherwise, should be distributed so that all classes of people who travel shall pay their equitable share of it and no more.

We would not favor the introduction of class cars so long as it is cheaper for the roads to carry passengers as they are now being carried. The question to be solved—and it is one that will ultimately solve itself—is whether roads can not extend this branch of traffic so as to increase the profits derived from it and better serve the public, by providing a wider range of accommodation for the "masses," based upon a difference in fares. The vast increase from year to year in our native population, the enormous emigration from abroad, the unparalleled growth of our cities and manufacturing industries, are swelling the multitude of those who in Europe would ride in third and fourth-class cars, and who are every day making class divisions here more easy and inevitable.

What we have said has been suggested by the returns of railway operation in Great Britain for 1884, recently made to Parliament by the Board of Trade. A brief summary of the general results we give elsewhere. The returns of passenger traffic show the number of passengers carried in each class of cars on all the roads of the United Kingdom during the year, and also the receipts from each class respectively, showing that of the whole number carried in the three classes of cars, 5 per cent. were first-class, 9 per cent. second-class, and 86 per cent. third-class; and of the total receipts, 14 per cent. were from first-class, 13 per cent. from second-class, and 73 per cent. from third-class.

These results do not differ materially from those of the previous year. They show very forcibly the relative importance of the third-class traffic, in the numbers carried and the revenue derived from it. The exhibit is, in fact, a very significant and one-sided affair in the matter of classes, and may be profitably studied by all who are interested in the increased development of passenger traffic on our own roads. It also suggests the inquiry whether travelers in parlor and sleeping cars do not contribute, relatively, much less to the revenues of the roads than people who travel in ordinary coaches, and whether a great many people who now travel very little or none at all, might not be induced to aid in swelling the receipts of the roads by traveling more.

MEASURING WORK BY CAR MILES.

The chief motive power clerk of one of our most important railroads, in a private letter to us, writes very lucidly about the means of restraining the useless waste of coal in locomotive service. He says:

> "I am very doubtful about the comparisons of the performance of engines sheet in the matter of coal consumption, as I think the calculation of the coal per car per mile is very questionable, although at present it is the best that can be done. An engine running with light-loaded cars shows away ahead of the same class of engine running with cars loaded to the maximum, both having the same number of cars per train. It would seem, therefore, that the only reliable basis for coal calculation would be the tonnage, and that the coal per 100 tons hauled would mean something. Tonnage per train, however, is hard to get at in time for any use, so I do not look for any reform in the near future."

Our correspondent is certainly correct in his belief that the only reliable basis for coal calculations is the tonnage hauled. Calculations based on the number of cars hauled never were accurate enough to be worthy of consideration by men who cared anything for accuracy, but of late years the basis has been growing daily more meaningless. Loaded cars now vary from 15 to 50 gross tons, and every augmentation of car loads increases the discrepancy between the light-loaded and the heavy-loaded cars. A difference of from 25 to 50 per cent. in the aggregate weight of trains having the same number of cars, is by no means uncommon. While matters remain in this condition, no railroad company can tell with certainty how economically or how extravagantly any individual locomotive is being worked. While a certain allowance of coal per car mile is the basis of fuel supply, the man who has made the best apparent record may merely have had the luck to get a run of light cars, and another engineer who has worked his engine to better advantage and made the economy of heat his constant care and intelligent aim, may get badly left on the performance sheet by having had the misfortune to pull heavy cars most of the month. This is no fanciful picture, but a true description of a common characteristic of train business. The trains on a division will happen so that most of the engines get about the same average loads, but a few engines will almost certainly be away out of the average, some above, others below, and this circumstance is sufficient to demoralize any system of accurate fuel supply. The enginemen are very well aware who are striving to do their work economically, and who are working in a careless, happy-go-lucky manner; and when, on examining the performance sheet, they find the latter class ahead of the former, they instantly conclude that the system which indicates such a result is worthless.

There is no special reason why this antiquated system of car mileage should be adhered to, except that there is not the cordial coöperation between two leading departments of railroad service which there ought to be. The locomotive department, while fully aware of the inaccuracy of car miles being used as the measure of work done, must content themselves with it because they can not obtain the tonnage of trains, and the traffic department can not be made to see the necessity for increasing their clerical work for the purpose of furnishing tonnage returns to the machinery department. Of late years, some roads have gone to great expense inaugurating a system whereby accurate records are kept of the coal used by each engine, but no satisfactory results can be obtained from the arrangement while there continues to be no accurate measure of the work done. The railroad manager who inaugurates a system of recording the work done by locomotives on the basis of ton miles will change loose guesswork into accurate measurement. Under that change he may call on his engines to transport 1,000 tons of freight 100 miles on a given expenditure of fuel, and justly insist on the work being done, or if it is not done within the figures, the blame of the failure can easily be located.

BEST MATERIAL FOR LOCOMOTIVE FIRE-BOXES.

In view of recent attempts to force back iron into use for the construction of locomotive fire-boxes, it is edifying to read many of the reports made by committees of the Master Mechanics' Association at the time when steel was beginning to be used for that purpose. A report made in 1869 says:

> "The experience of many of our leading roads shows that the average life of an iron fire-box, excepting Low Moor iron, seldom exceeds three years, and often fails to reach eighteen months (the plates in every instance being carefully selected from the standard brands of responsible manufacturers). Many sheets are blistered on account of poor welding, others are 'burned out,' and in some instances the sheets seem to have hardened, becoming so brittle as to be readily broken by the blow of a hammer. * * * Mr. Anderson, of the Chicago & Northwestern Railway, has upon the road an engine with a fire-box manufactured of Cyclops steel, which has been in use for about eight years. A careful examination of this box, upon a recent occasion, failed to show the slightest signs of wear, although running upon a division of the road where the coal and water used have been very destructive to iron and copper fire-boxes."

The report on boilers the following year, prepared by three of the ablest master mechanics belonging to the association, namely, S. J. Hayes, C. F. Jauriet and H. Anderson, was equally decided against iron and in favor of steel. A paragraph in that report, which fairly represents the tone of the whole document, reads as follows:

> "A fruitful source of failure of iron sheets may be attributed to blistering, and this objection, under the present system of manufacture, can hardly be avoided. Even the Low Moor iron is not entirely free from this fault. Of course the majority of the best iron plates will furnish a good degree of service without this objection being manifested; but as in some instances failures have occurred from this and kindred sources, so may we reasonably anticipate their recurrence; and, seeking for a material which will assure us positive immunity against these failures, we find nothing so certain as the homogeneous steel plate."

Mr. Charles Graham, Master Mechanic of the Delaware, Lackawanna & Western road, displayed extreme reluctance to abandon iron for fire-boxes. As late as 1876 he reported that his experience with iron was quite satisfactory. At that time he stated that he was using a steel fire-box with one of the side-sheets corrugated and the other plain, and he intended doing the same with an iron fire-box, in order to test the relative merits of plain and corrugated sheets, also of steel and iron sheets.

We recently addressed a letter to Mr. Graham, inquiring what his subsequent experience with iron and steel sheets indicated as to their relative value, and he replied:

> "Yours of the 26th inst. regarding my experience with iron and steel fire-boxes at hand. At that time (1876) my experience had mostly been with corrugated iron side sheets, and the only trouble with the iron was that it would blister. But at that time, all things considered, I thought iron was preferable for fire-boxes to the steel produced, as the quality of the steel then made gave it more of a tendency to crack than the steel made at present. I am now putting the side-sheets in fire-boxes straight, and of steel, which I now think is the best material for fire-boxes, and with which I have had no trouble."

LARGE AND SMALL WHEELS.

It has been said of late that 42-inch wheels are getting out of favor, and that some car-builders think of abandoning their use and returning to the 33-inch standard. The reasons are said to be the greater leverage of the larger wheel on the axle, which increases the power of the brakes and the danger of loose wheels. A prominent car-builder on one of the Eastern roads upon which a good many 42-inch wheels are used, when asked for his views on the subject, said he had experienced no such trouble, and characterized such reports as nonsense. He thought that loose wheels could in all cases be traced to small axles that were too light for the work, and that bent axles were likely to be frequent with any wheels when the loads are heavy and the centers of the axles not of sufficient size. He also thought the master car-builders' standard axle should be enlarged at the center.

Much has been said and written adversely to 42-inch wheels which has little foundation in ascertained facts, but has been derived from hasty impressions, prejudice and hearsay. Careful investigation and experiment have shown that the leverage of a 33-inch wheel on the axle is only 21⅓ per cent. less than that of a 42-inch wheel. The strain at the wheel-fit of the smaller wheel is, of course, increased correspondingly, but the increase is hardly large enough to be of much account. In regard to the action of the brakes, it is often said that the increased diameter of the wheels gives the brakes increased power, the tendency of which is to twist the wheels on the axle and loosen them. Both brake and rail act at the circumference of the wheel and do not produce a torsional strain. They tend to bend the axle, but as they do not act at an angle, there is no greater strain on the axle than there would be with a smaller wheel, unless the axle is sprung. There is some trouble, however, with the large wheels on account of the brakes heating the tires. These tires expand nearly 28 per cent. more than the 33-inch wheels with the same degree of heat. The strain npon the tires and danger of breakage are proportionally increased, but care and proper fitting will remedy all these difficulties, as has been shown by years of usage in this country and abroad.

The 42-inch wheel has advantages that more than compensate for these alleged defects. They make 480.3 revolutions per mile, against 611.7 by the 33-inch wheels, the smaller wheels making 27¼ per cent. more revolutions than the larger ones. With a train moving 45 miles an hour, the journals of the large wheels revolve no faster than those of the small ones when going 35⅓ miles an hour. The danger from heating is reduced in the same proportion. It is often said that in practice there are never any hot boxes with a 42-inch wheel on an M. C. B. standard axle. While this may not be strictly true, the figures show that there is much less friction, and consequently less danger of hot boxes. The time required in overcoming an obstacle like a rail joint or other irregularity in the track, is increased in proportion as the speed is diminished. While this improves the riding of a car by making the blows less sudden, it diminishes the horse-power needed for propulsion. This latter point has frequently been disputed on the ground that weight has to be lifted over the same elevations, and these are the same in number and height for small and large wheels. This is very true, but the time required for doing the work is, as we have seen, increased by a certain percentage which diminishes the power in the same proportion. The difference in the action of large and small wheels can be felt by the people in the cars more readily than it can be described. The shocks communicated to a car with large wheels are less severe, and the motion is much easier than with small wheels of the same kind.

CAR SEATS.

Is it possible to construct seats for ordinary passenger cars, or for any other class of cars, that will be so entirely satisfactory to people who sit in them as to silence complaint? Thus far the thing has not been done, but whether the fault is with inventors or car builders—who certainly have no inducement to make bad seats—or with an unreasoning and too exacting traveling public is another question. There is discontent and a demand for something better, and this feeling finds expression in a recent article on the subject in the *Scientific American*. The alleged defects in car seats are set forth by the writer with a good deal of particularity, and they are withal so numerous and apparently so irremediable under the existing conditions of railroad traffic that the careful reader of the article may well despair of living long enough to see a car seat that shall be a flowery bed of ease and altogether lovely. The indictment framed by the writer is so sweeping as to force the conviction that there is something wrong in car seats from top to bottom and every which way, and that nothing but an "entirely new departure" in their construction will make them what they should be. To summarize his points: the car bodies should be wider; the seats are not wide enough; they should tilt back; there is not room enough between the seats; the cushions and backs should be convex wherever they touch the person; the foot-rests are out of reach except for tall people; the seat-frames are too low and there is no room underneath for satchels; metallic arm-rests are a nuisance; the car aisle is too narrow; etc.

The most important of these defects are manifestly curable under certain conditions, namely, wider car-bodies, and fewer seats in proportion to the length of such bodies. It is strictly a matter of floor space, the same as with stock cars. The more cattle they can carry per superficial area, the greater the profit and tendency toward lower rates. At the present rates of fare a car of a given length must be capable of seating a certain number of persons, or the traffic will not be remunerative. Any change in the style of seats, in order to render them more luxurious and comfortable to the occupants, must not be such as to require a larger space on the car floor. The limitation as to space must not be lessened unless the fares are increased correspondingly.

That seats can be devised that will be an improvement in many respects upon those now in use without occupying any more floor space, is highly probable. The field is open to inventors, of whom there are thousands in the country, of first-rate ability. We take it for granted that the improved "new departure" seats must necessarily be reversible, a feature that can not well be dispensed with, and whatever changes are made in other respects must be subordinated to it, as well as to the allotted space to which the seat is restricted. Under these conditions there is evidently not much room for widening the seats from front to back, and as for tilting seats and concave cushions, the reversibility of the backs and the arrangement of the seat springs are very serious obstacles in their way. A great deal has been said about the importance of making the seats and seat-backs fit the anatomy of the sitter. There is a little bit of delusion in this. No person keeps in a rigid unchanging position while he is in a car seat. If he did, it could be made to fit his anatomy to a nicety, making allowance for giants, dwarfs and children, who would have to adapt themselves to their surroundings as best they could without finding fault with the seats. To obtain a perfect model of a seat to fit an average sort of person, let a quantity of plastic material be arranged in the general form of a car seat and seat-back, and then let such person, clothed in athlete costume, seat himself in the plaster just as he would sit in a car. A cast from nature taken in this way would show at once just what the form of a seat should be to suit the rear anatomy from knees to occiput, and be an immense help, if not an infallible guide, to inventors in their efforts to contrive a patent car seat to suit every body. As the distance from people's knees to their heels varies very much in different persons, and as the height of a car seat from the floor can not very well be made adjustable, so as to suit every body who occupies it, the remedy for any discomfort on this score must be provided by properly arranged foot-rests.

Surprising as it may seem, there is also a deal of complaint about parlor car chairs, although from the larger floor space to the number of seats in such cars it would seem that their occupants ought to be relieved of many of the troubles that are unavoidable in ordinary coaches. We have no space, however, for dwelling upon this branch of the subject at this time, but will repeat what we have suggested heretofore, that if inventors and car-builders can not produce a style of seat for day coaches, free from defects within the limitations to which we have referred, then it is obviously the duty of those who complain loudest to produce one for them or stop complaining.

BETTER TIMES AHEAD.

During the past year a great many encouraging signs of a business revival have been chronicled in the newspapers, but like fitful gusts when the ship is waiting for a stiff and steady breeze, these signs were not immediately followed by the looked-for improvement. Now, however, there is no mistake about the renewed activity, the evidences of which are increasing every day. It does not appear to be limited to particular branches of industry and trade, but is quite general. There is a more confident feeling among purchasers, prices are well maintained, and in many instances there has been an actual advance. It may be premature to assume that the tide has turned, and that the country is now in the incipient stage of another period of booming prosperity, but the existing conditions certainly justify the assumption. The law of reaction will take its course. The period of stagnation through which we have passed was a reaction produced by the excessive activity which preceded it, and it is now time for the pendulum to swing the other way again.

It is unnecessary to enumerate all the apparently favorable conditions which exist. They may be fairly generalized in the proposition that with its vast territory, natural resources, population and capacity of consumption and production, the country can not relapse into a state of permanent inertia. The railroad situation is undoubtedly a very important factor in the impending business improvement. Heavy expenditures for all sorts of supplies and for the maintenance of track and equipment, have got to be made in the immediate future, and the money will be forthcoming in some way, even if a few of the millions of idle capital that has been so long corked up are needed for the purpose. The warring trunk lines have buried the tomahawk, and none of them are rich enough just now to afford to dig it up again. A good many thousand miles of new railroad are yet to be built at the South and West, and there is no telling how soon the new boom for construction will begin.

ELECTRIC LIGHTING IN SHOPS AND TRACK-YARDS.

The electric lighting of railroad track-yards and machine shops seems to be making very successful progress, and the time is doubtless near at hand when this method will come into general use for these purposes. The great track-yard of the Lehigh Valley road, at Packerton, Pa., where the coal trains are made up, is lighted by arc lights suspended from poles, and with the most satisfactory results. The movements of cars and trains can be clearly seen independently of signals, and the darker the night the more effective is the illumination. It is inferior only to daylight, and enables the men to carry on their work with comparative safety. No difficulty has been found in carrying the current long distances, and the lighting is practically attended with much less inconvenience than with the old-fashioned lamps and reflectors. The expense is said to be much less, and as regards the quantity and the quality of the light, there is no need of making any comparison. In out-of-door lighting, as in track-yards, parks and public grounds, much of the light given out from the top of high poles is wasted in the air from the absence of reflectors, which are little used in connection with the arc light, although it would seem that their use, if practicable, could in many cases be made to double the quantity of light actually available.

In some car and machine shops electric lighting has been introduced to take the place of gas or lamps in winter. This has been done in the shops of the Erie road, at Susquehanna, Pa., where in each department the general diffusion is so strong that work can be carried on almost as well as in the daytime. With the common methods of lighting, this general diffusion can not be had except in a very imperfect way. There are little halos here and there around each lamp, leaving the large intervening spaces in comparative darkness, and casting shadows more or less dense about all the tools. Electric lighting changes all this, but some small, portable oil lights need to be used to enable the finer details of work to be seen.

The proper arrangement of the large arc lights has not yet been brought to perfection. They are frequently located so as to throw a blinding glare into the faces of the workmen, or a considerable portion of the light is wasted by being thrown against a black wall, ceiling or roof. Opal globes are very much used, under the impression that they make the light softer for the eyes, but it is hardly a sufficient plea for throwing away fifty per cent. of the light produced. Some of these globes waste even more than that. The better way is to use a less strong light without a globe. In waiting rooms, electric lights are usually scattered too much, which diminishes the quantity and makes too much glare. A better effect is obtained by placing them in a group.

JUDGING LOCOMOTIVE SPEED.

> An engineer accustomed to large drivers loses time if transferred to an engine with small drivers. He gauges speed by the motion of the cross-head, which in this instance is rather deceptive. Similarly, a man used to small drivers overruns if transferred to larger wheels.—*Mechanical Engineer.*

From experience gained on the foot-board, we are disposed to think that our contemporary's remarks apply only to young engineers who have not learned a very important part of their business, namely, judging speed. As on most locomotives the motion of the cross-head can not be watched from the cab unless the engineer pushes his head out of the side window, it is certainly a rather deceptive way of judging speed, especially on a dark night, or when the thermometer has lost its way down in the bulb. An engineer who had to watch the motion of the cross-head on such a night in order to tell how close he could come to his meeting points, would be apt to come in without part of his right ear. Nearly every engineer can tell pretty accurately how fast his engine is running, under circumstances that would be terribly confusing to a novice, but very few of them could explain how they understand about the speed. Judging accurately the speed of a locomotive like all other operations of skill, is reached only by practice, and the men who are most expert at the work can seldom explain clearly how it is done, and it certainly does not depend on what can be seen of the machinery in motion. In daylight the trained man can readily tell whether or not he is keeping time, by the way the telegraph poles and other objects on the right of way are left behind; but when dense darkness makes all objects invisible, other means of judging speed must be found. Express trains keep time as well in night-time as they do in daylight, so it must be concluded that the engineers in charge know how to regulate the speed. They do it by a sort of instinctive process, various small things that to the untrained eye and ear would be meaningless, supplying the means of judging. Objects are seen differently in a clear night from what they are in a dark night, and high wind or heavy rain introduces its own confusing elements, while a rough piece of track would make a raw runner think he was getting over the road at terrific speed, when he was losing time. The instinctive power of training raises the experienced engineer above the influence of deceptive surroundings, and in the worst night that blows, the click of the wheels on the joints, the rumble of the wheels on the rails, or the flash of light on a passing object, enables him to tell how he is getting along, but the cross-head is very seldom seen between stations.

PRACTICAL VS. TECHNICAL.

It is extremely difficult for the practical, self-educated mechanic to understand and appreciate the value of technical formulas. Part of this arises from the fact that he has often seen work laid out and proportioned according to the books, but which proved to be too heavy or too light. His own judgment, unassisted by mathematics, usually enables him to detect points of weakness or of superfluous strength, but when he attempts to begin at the foundation and produce proportions that shall be strictly correct, he is slow to admit that errors in his practical designing can be discovered by calculation. In car construction, for example, there are many points where the simplest calculations show that the judgment of the so-called practical designer is at fault. The discussions at car-builders' meetings in regard to the strength of materials illustrate this. Hours are spent in discussing questions involved in points of construction, any one of which might have been put to rest in a few minutes by a mathematical demonstration. There are cases also in which the proper proportions in a particular feature of construction have long been indicated, if not fully established, by scientific formula, yet the sufficiency of the proportions is still an open question for continual debate. Perhaps the most striking illustration of this is the existing diversity in the body framing of freight cars of like capacity and dimensions. It would seem that in this matter the strength of the materials, the size and relative position of each member of the structure, and the maximum strains to which each is subjected, could be ascertained with an approximate accuracy sufficient to determine a system of framing that would be accepted as the best, and so have an end of discussion. In a matter of this kind, "my experience," and "my opinion," should at some time or other give place to certainty.

There is also a host of unsettled problems which can be solved more decisively by experiment than by scientific induction—the wheel base of trucks; weight on side-bearings; material for brake shoes; rigid or swing motion trucks; etc.—but the experimentation is either unskillfully conducted, or its results are not heeded. The drift of opinion at all events remains as unsettled and variable as ever.

A correspondent connected with the mechanical department of one of the great consolidated systems of railroad lines, informs us that there is considerable difference of opinion among his associates in regard to the "point of tread line of tires," and that he has looked through all the authorities upon wheel sections, etc., without finding anything decisive upon the subject. He sends a tracing of a wheel and rail section, and wishes to know whether the Car-Builders' Association has ever settled the following points, viz.:

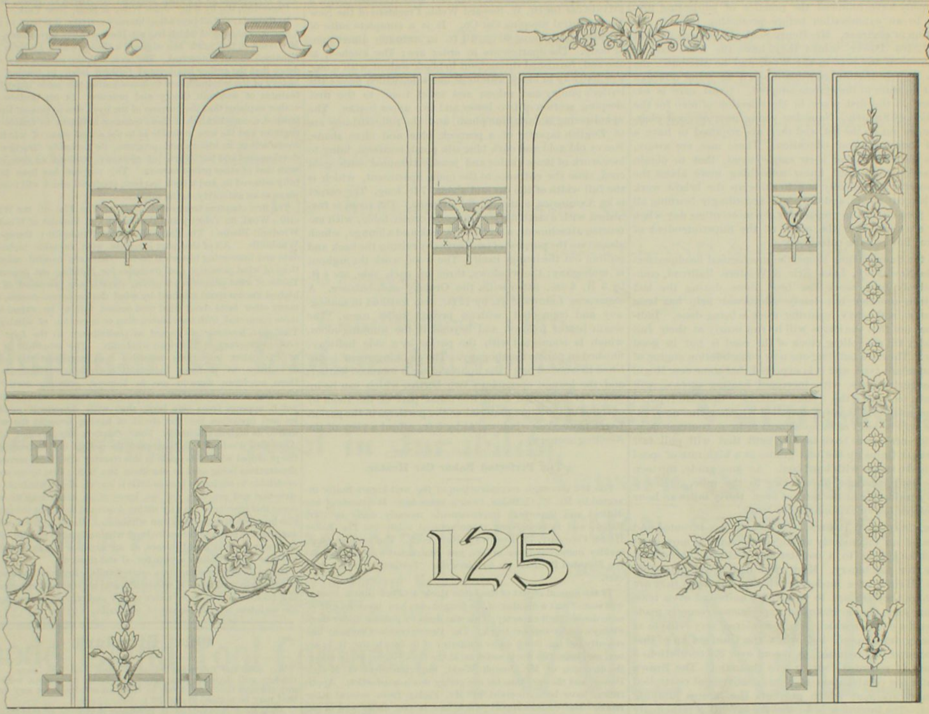
1. Which is the point of tread line?
2. From which point is measured the gauge of the wheels?
3. From what point on the section to back of flange is the thickness of flange measured?

The first question is somewhat vague, and we are not quite sure that we understand it. The tread of a wheel is that portion of it which comes in contact with the rail. This is not a line, but a band or surface of variable width. In regard to the second question, we do not know that any point has been designated except the back of the wheels; and as to the third question, the old rule to begin from the middle of the horizontal space occupied by the fillet is as good as any for measuring the thickness of the flange.

The standards and drawings published by Master Mechanics' and Car-Builders' Associations, should give the information asked for; but when they are carefully examined, they are found to be very confusing and unsatisfactory, of which the questions of our correspondent are an evidence. So long as track gauges and rail sections are a variable quantity, as they are now and are likely to be for a good while yet, the attempts to adjust wheel gauges and flanges to such prescribed dimensions as will be accepted and adhered to as standards, are likely to prove futile. The right way to build any thing is to begin at the foundation, and in this case the foundation is a uniform rail top section and track gauge.

In a recent issue of the CAR-BUILDER we published some particulars of tests made by Mr. R. W. Bushnell, Master Mechanic of the Burlington, Cedar Rapids & Northern Railway, to ascertain the relative value of steel and iron in locomotive fire-boxes where the bad water was very destructive to heating surfaces. The data obtained were too meager to draw fair conclusions from, and the matter is still under investigation. But our worthy contemporary, the *Railway Register*, which is a blind, unreasoning advocate of iron, uses what was said in our columns as sufficient information for assuring its readers that "steel, after a fair and most painstaking trial, has been discarded, and refined iron is now used exclusively." That is an unscrupulous distortion of facts. In his search for the most durable material, Mr. Bushnell has decided to try one fire-box of Tennessee iron, but he continues to make the other renewals of steel, and nothing was said in our columns that would have led a truthful writer into the error made by the *Register*. It makes no difference whatever to us what material may be found most desirable for the construction of boilers and fire-boxes, and those who favor different metals are welcome to the use of our columns for giving their reasons for the faith that is in them; but we decidedly object to being misrepresented so as to appear as advocating iron in preference to steel.

IN the paragraph descriptive of the passenger station house of the New York, West Shore & Buffalo Railway, illustrated in our September issue, the design of the structure was ascribed to Mr. John D. Fouquet, Superintendent of Buildings for the road. We are informed that this is an error, and that this particular station house was designed and drawn by Mr. H. C. Blanchard, architect, of New York.



"RENAISSANCE" EXTERIOR DECORATION FOR PASSENGER CARS.

Drawn by J. Geo. Beckley, Green Island, N. Y.

The illustration represents a new design for exterior car decoration. The feature of the design to which special attention is directed, is the placing of the decorations on the pier panels, which is entirely new. If the spaces marked × are filled in with a different color, lake for example, it will add to the effect. The door and corner-posts may be treated in like manner. The striping below the belt-rail, it will be observed, is continuous, running the whole length of the car, and forms a Grecian stripe as a whole. The stripes should be not less than ¾ of an inch in width. A car treated in this style will present a very attractive appearance, and the decorative work on it will not look crowded.

Inconvenient Terms and Names.

It would be a great boon to the whole community, and especially to newspaper writers and the publishers of railroad literature, if the terms "Railroad" and "Railway" could be merged into one word, so as to do away with the senseless discrimination that is kept up between them. As it is not easy to invent a new name to supersede both words, one of them must be dropped or we must keep on using both as we are now doing. There are, it must be admitted, some serious obstacles in the way of a change. Sundry weekly journals, and other publications devoted to railroad interests, have adopted one or the other of these terms as a part of their recognized names, and it is too much to expect that any of them will willingly change the name they have adopted for the mere purpose of getting rid of a term which some other journals regard as superfluous. It would be like striking their flag for the little matter of verbal uniformity and convenience, when they might just as well keep it flying. But the thing will be done one of these days. It took years of agitation to get "standard time."

It may be asked, Which of these words, "Railroad" and "Railway," is intrinsically the best? It may be a matter of taste, but our own bias is in favor of "Railway," and for obvious reasons. It is the shortest word, the most euphonious, the most easily articulated, and at the same time quite as expressive and significant as its rival. "Railroad," on the other hand, is suggestively stiff, formal, heavy, strait-laced and solemn. But inasmuch as both names will continue to be used for a good while yet, in this country at least, there should be a uniform abbreviation for each, to be used when it is not desirable to write the words in full. As to what these abbreviations should be, we concur with the suggestions of the *Railway Age*, that "Rd" and "Ry" (without an apostrophe) are the most suitable for the respective words. We have not decided to introduce the proposed innovation in our columns, but the general adoption of something of the kind by leading railroad journals is much to be desired.

There is another matter intimately connected with this subject which also deserves some attention. The names of many railroads, or more properly railroad corporations, are too long by half. To write them out in full is an irksome labor, and where frequent repetition is necessary it is next to intolerable. If initials are used, their interpretation in most cases must be guessed at by people who do not happen to live near the line; and those who do live near such lines have to invent local nicknames for convenience, some of which become more than local on account of their appropriateness and brevity. The names of many roads are longer than they need be for indicating their geographical location. In numerous cases the names of the terminal points are sufficient, and even better than when combined with one or more intermediate places. The existing names of some important lines can not be fully expressed without reciting the names of four cities. For example: Cleveland, Columbus, Cincinnati & Indianapolis; Chicago, St. Paul, Minneapolis & Omaha; New Orleans, Baton Rouge, Vicksburg & Memphis, etc.; and to complete the corporate name, "Railroad Company," or "Railway Company," must be added to the names of the cities. This style of nomenclature is adopted by shorter and less important lines, which aggravates the evil by multiplying local designations and increasing the chaos of unintelligible initials.

Crank Axles in Great Britain.

A discussion has been kept up in the British railway and other technical papers for several months about the wisdom of using crank axles for locomotives, but the railway companies using that form of axle do not act as if they cared a cent what scientific investigators thought about the matter. A table recently published shows that 12,943 engines are in use in the British Isles with crank axles, and 1,905 engines with outside cylinders. Of the crank axles 5,955 are made of steel. The curious fact about steel axles was brought out that if an axle of that material is not properly adapted for the strains of service, it will give out early, making a shorter mileage than an iron axle usually does; but if the steel passes a certain mileage below what an iron axle generally fails at, it will run safely till it is weakened by wear and turning down. Mr. Clement E. Stretton, a well known engineer, writing on this subject, says: "The question of crank axles breaking has sometimes been considered as one of mere strength, and as steel is stronger than iron it has been assumed that steel must be the best for axles. Now I contend that many other matters have to be considered besides tensile strength. An axle may be too stiff and too strong, and this great strength, amounting to rigidity, is the principal cause of its own weakness. Extra shock and strain are thrown upon it by its extra strength, and as it will not give way in the least to circumstances, it is absolutely obliged to break. It therefore follows that an axle must be strong, but at the same time contain a certain amount of elasticity, and it is not so much a question of simple strength and brute force as of capability to resist strains.'

Malleable and Wrought Iron Draw-Bars.

The following tests have been sent us for publication:

Wrought Iron Draw-Bar (Weight of Drop, 1,600 *pounds.)*

1 blow at 4 feet
1 " " 6 "
1 " " 8 "
1 " " 10 " Slight fracture of weld 2 inches from pin-hole (one side).
1 " " 12 " Broke at same place.

Malleable Iron Draw-Bar (Weight of Drop, 1,600 *pounds).*

1 blow at 4 feet
1 " " 6 "
1 " " 8 " Began to bulge.
1 " " 10 "
1 " " 12 "
1 " " 14 "
1 " " 16 " Fractured at tail end on side of hole all the way through.

A PARAGRAPH was inserted in our last issue stating that the Pennsylvania Railroad Co. had discontinued the practice of preparing sheets showing the relative performance of locomotives, and that it was regarded by the company as a useless expenditure. We are informed from a reliable source that this is an error, and that only the printing of such sheets has been discontinued, the time and money expended for that being regarded as unnecessary. The performance sheets will be prepared as heretofore, but will not be printed.

A PRELIMINARY meeting of the Master Car-Builders' Club will be held at 113 Liberty street, New York, on Thursday evening, October 15, to make arrangements for the usual series of meetings to be held during the next six months.

Sale of Car Shops.

The shops of the Anniston Car Company, at Anniston, Ala., will be sold by the Assignee of the property, on Tuesday, Nov. 3. The property includes five new car sheds, one dry kiln, wood and iron-working machinery, 6,000 feet of railroad track and seven two-room cottages. The capacity of the shops is ten freight cars a day, and the estimated value of the entire works is $50,000.

For nearly twenty years the Illinois Central Railroad Company have followed the practice of subjecting firemen to an examination before promoting them to the position of engineer. Mr. Henry Schlacks, Superintendent of Motive Power, thinks they have the best body of engineers of any road in the West, and he attributes the high degree of efficiency maintained as being due in a great measure to the system adopted. Great care is exercised in the first place in the selection of men for the position of firemen. None but young men of good character are put on the list, and they are required to have a good common-school education. These men are aware, from the first day of their employment, that to obtain promotion they must know something more about the locomotive than merely how to shine up the bright work and keep up steam, and they are accordingly learning all they possibly can to prepare for the momentous day when they are called into the office of the Superintendent of Motive Power to be catechised.

In the Susquehanna shops, the mechanical headquarters of the New York, Lake Erie & Western Railroad, comparatively little work has been done during the last eighteen months, but lately additional help has been taken on, and heavy repairing work is being done. Indications are that the shops will be run nearly at their full capacity till the rolling stock of the road is put in good order. They are building one new consolidation engine of the standard type, and it is expected that some new Mogul passenger engines, with increased heating surface, will be built to replace the "stem winders" that are reputed to steam badly. It is yet unsettled whether the new engines will be built at Susquehanna or in a contract shop. The intention is to have engines built that will pull fast passenger trains up the long grades at a high rate of speed and make steam with hard coal. As one grade, thirteen miles long, averages 52 feet rise to the mile, getting a heavy train over at the rate of even thirty miles an hour represents heavy expenditure of work.

Mr. Charles T. Brown, of Chicago, has invented and patented an ingeniously arranged mechanical movement which he applies to a counter and recording speed indicator for machinery. Most recording speed indicators work all right at a moderate velocity, but when they are run high they are apt to jump over units and even tens. During some engine indicator experiments recently made we used a counter which was considered very reliable at ordinary train speed, but when the train got up so that the counter was required to record over 300 revolutions a minute, it recorded four or five thousand. The Brown counter is a combination of a cam movement controlled by an escapement which prevents the figures jumping round. The intention is to use the invention principally for street cars to record the fares, but we think it might be applied very well to locomotives where indicator experiments are being made. The small high speed indicators, so useful for showing the speed of ordinary machinery, are generally inapplicable to locomotive purposes.

The Illinois Central Railroad Company experimented for several months with an electric head-light, but they did not find it satisfactory, and they have abandoned the idea of using electricity for that purpose. Talking the other day in the Grand Pacific Hotel, Chicago, with a prominent head-light maker, and Mr. Hedden, of the Rogers Locomotive Works, we obtained considerable insight into experiments that had been made to improve the head-light. Many years ago, Mr. Hedden applied the calcium light to a head-light, and he overcame all the difficulties in the way of obtaining a steady luminary. The light was clean, cheap and intense, illuminating the track far in front of the locomotive. It was a success in every respect during warm weather, but when frost came along its hoary spangles accumulated on the head-light glass and fairly closed in the light. This ruined the prospects of the calcium head-light, and it is likely to be fatal to the efficiency of the electric head-light. The great mass of railroad officers believe that an electric head-light serves no good purpose on a locomotive, and engineers do not want them.

A public recognition of the fact, says the *Railway Review*, that shoddy materials are in growing use by railways, has been slow of development, but when once thoroughly aroused we trust that it will make itself felt in a wholesome degree. The times have indeed been hard; all manner of turns have been resorted to by manufacturers to help out failing revenues during the long period of fierce competition and steadily lowering prices, and all manner of economies have been forced upon railways, which have had light traffic and abnormally low rates. But these oppressive exigencies of the times constitute no excuse for the now much-complained-of laxity in attention to quality by makers and by consumers. The maker should not allow inferior qualities to leave his hands, and the consumer should not tempt the maker so to do by encouraging him to so compete in price that inferiority of product becomes a necessity. Intelligent railway purchasers have reasonably close ideas of cost of manufacture, and when an article is offered at a figure which they may know to be below the cost of a properly constituted and well made product, they should certainly give heed to the unavoidable inference that an irregularity exists somewhere.

The Barney & Smith Mfg. Co. has recently built a private car for Dr. W. Seward Webb, President of the New York Central Sleeping Car Co. It is a complete suite of elegant apartments, 60 × 10 ft. in extreme dimensions of body. The apartments in order are: The kitchen, at one end, furnished throughout in black walnut, with a narrow hallway in black walnut at one side, which passes the butler's pantry and saloon and toilet room to the first sleeping section of two lower and two upper berths. The upholstering is dark blue plush, and the roll curtains are of English tapestry of a peacock blue and olive shade. Heavy old gold and dark blue silk plush portieres, hung to lace-work of brass chains and jewels trimmed with gold cord, close the entrance to the main apartment, which is the full width of the car and about 17 ft. long. The carpet is an Axminster, matching the drapery. The room is furnished with a stationary mahogany center-table, with extension attachment, a secretary's desk and a lounge, which also serves the purpose of two berths by raising the back and pulling out the lounge itself. The wood-work throughout is mahogany; the windows, three on each side, are 4 ft. by 3 ft. 6 in., fitted with the Ormsby sash-balance. A stateroom follows, 8 ft. by 12 ft., also finished in mahogany and connected with a private toilet room. The steam heater follows, and beyond it the smoking-room, which is connected with the parlor by a side hallway, finished in paneled mahogany. The smoking-room is finished in smoked oak; the upholstering is morocco leather, and the lounge opens into two berths, which can be inclosed or separated from the other part of the room by curtains of the same material as the portieres in the parlor. Large plate-glass windows, 4½ by 5 ft., afford a view of the receding scenery.

The Perfected Baker Car Heater.

This is a thorough reconstruction of the well-known heater invented by Mr. W. C. Baker, twenty years ago. It consists of ten distinct and important improvements recently made by Mr. Baker, and is now being manufactured solely by The Baker Heater Company, 72 Broadway, New York. The company has, besides numerous other orders, just contracted with The Brooklyn Elevated Railroad Co. to place the "Perfected" on all their cars.

In the annual report of the Little Rock & Fort Smith road it was stated that a number of the freight cars had been rebuilt so as to double their capacity. This was done by putting under them Finlay's center-support truck. The Pennsylvania Company has recently put this truck under a number of its cars to test it in actual service. The work was done at the Fort Wayne shops under the direction of Mr. Joseph Wood, Superintendent of Motive Power, and the cars thus far are giving much satisfaction. Applications have been received by Mr. Finlay from several other roads. The center-support truck can be put under new or old cars at a moderate cost.

The Wilson & Walker Co. (Limited), of Pittsburgh, Pa., have issued a handsomely bound catalogue of 163 pages, embracing the specialties of their manufactures, including solid head draw-bars, their three-link wrought iron draw-bar, arch-bars, follower-plates, coupling links and pins, etc. The volume also contains 75 pages of useful information in the form of tables giving weights and dimensions of wrought iron work, strength of materials, weights and measures, etc.

Messrs. Andrews & Clooney, of New York, manufacturers of railroad car springs, have patented a new spring for street cars. It is a combination of rubber and steel, the design of which is to carry the car as well when empty as with the heaviest load and equally well with varying loads. These springs have been thoroughly tested in regular service on several street lines, and are adapted to all forms of boxes and sizes of cars. Sample sets will be sent to any road that may desire to give them a trial.

The Cummer Engine Co., of Cleveland, O., has recently received the following orders for engines: A 55 h. p. engine for the Torrington Manufacturing Co., of Torrington, Conn.; 130 h. p. engine for the Baker Wire Co., of Des Moines, Ia.; one of 55 h. p. for the Journal Co., of Kansas City, Mo.; one of the same size for the Kansas City *Times*, also Kansas City; a 67 h. p. engine for the Sikes Chair Co., of Buffalo, N. Y., and one of 89 h. p. for F. Baer, Greensburgh, Pa.

The Baker Heater Co., New York, have recently furnished several of their "Perfected" Heaters to the Harlan & Hollingsworth Co. and the Boston & Albany Railroad.

History and Early Reports of the Master Car-Builders' Association. Issued by the Association.

This publication is uniform in style and appearance with the recent annual reports, and contains 154 pages. It contains an account of the preliminary meetings of car-builders prior to the formation of the Association in September, 1867, and also a reprint of the reports of the first six annual conventions, or from 1867 to 1872 inclusive. These reports were merely brief abstracts of the proceedings, and the most of them were not printed in a form suitable for preservation. The collection of these earlier records of the Association in a single volume is very desirable for reference, and especially so to the present membership. It will also enable their successors to compare the early with the later and future history of the organization, and note the relative importance of the subjects discussed and acted upon at the different stages of progress in car construction.

The work has been prepared by the Secretary of the Association in accordance with a resolution of the Executive Committee at its meeting in January last.

Mr. James F. Hobart, an occasional contributor to the *American Machinist*, will hereafter represent that journal as a special correspondent, and will in that capacity visit shops and make notes of mechanical matters for publication.

The Windmill as a Prime Mover: By Alfred R. Wolff, M. E
Pages 159, 9½ by 6 in. John Wiley & Sons, New York.

In these days of all-prevading literary activity, it is hard to find a mechanical subject which has not been written threadbare, yet Mr. Wolff in this work has engaged a theme which hitherto has remained almost untouched. The book supplies satisfactory evidence that the author has devoted faithful labor to tracing the history of the windmill, and to investigating the more important features of windmill theory and practice. In his preface the author explains that the purpose of the book was to present in one treatise, a consideration of these features sufficient to enable the engineer and the user to decide as to the actual state of windmill construction, its history and progress, its probable direction of development and the degree of economy attained as compared with that of other prime movers. This purpose has been faithfully adhered to, and a book has been produced which will take its place as an authority on the subject.

The first chapters treat respectively of The Use of the Wind mill; Wind, its Velocity and Pressure; The Impulse of Wind on Windmill Blades; The Early History of Windmills; European. Windmills. All of that part is replete with valuable technical data and interesting historical facts. There are careful calculations of wind pressures and formulas for figuring out pressures. Tables of wind pressures are given, records are presented of the highest known speed attained by wind during severe storms, and many other facts about wind that cannot fail to be valuable to those connected with the construction or operation of windmills. That part, however, we regard as preliminary to the four important chapters on American windmills. The windmill is one of the oldest inventions whereby man harnessed the power of nature to perform industrial operations. Hundreds of these machines were in use in Europe, grinding corn and pumping water long before the steam engine was invented, yet it appears from this book that with American mechanics and inventors lies the credit of having brought the windmill to its highest efficiency. Four chapters are devoted to the American windmill. In that part the details of construction of the principal windmills made in this country are given, numerous illustrations being used to elucidate the text. It is by no means creditable to engineers that so little is known about windmill construction and practice, and we know of no easier way to overcome this ignorance than by sitting down and studying the part of this book relating to American windmills. Most engineers will be surprised to learn that hundreds of windmills have been in use on railways for over twenty years, at an expense not exceeding an average of five dollars a year for oil and repairs.

Space forbids us going into more details. Railroad companies are the principal users of windmills, and we cordially recommend this book to inspectors of water supply and others connected with the maintenance and repairs of windmills.

Our Directory.

We note the following changes since our last issue. Our readers will do us a great favor by giving us prompt notice of any changes that may come to their knowledge or of any errors that may be noticed in our list:

Atlantic & Pacific.—D. B. Robinson (formerly of the Mexican Central) has been appointed General Manager. F. W. Smith has resigned as General Superintendent.

Canadian Pacific.—Thos. G. Shaughnessy has been appointed Assistant General Manager, and Mr. Alex. C. Henry Purchasing Agent.

Chicago, Milwaukee & St. Paul.—F. D. Underwood has been appointed Superintendent of the Iowa & Dakota Division in place of Mr. G. W. Sanborn, resigned. H. R. Williams succeeds Mr. Underwood as Superintendent of the Southern Minnesota Division, and E. H. Graves, late Assistant to Mr. Sanborn, takes Mr. Williams' place as Superintendent of the Iowa & Minnesota Division.

Cincinnati & Eastern.—J. C. Homer is appointed Master Mechanic in place of Arthur Donaldson, resigned.

Cleveland, Columbus, Cincinnati & Indianapolis.—E. B. Thomas has resigned as General Manager, and G. M. Beach has been appointed Assistant General Manager.

Detroit, Mackinac & Marquette.—Andrew Watson has been appointed General Superintendent, in place of Daniel McCool, resigned.

East Tennessee, Virginia & Georgia.—W. H. Thomas has been appointed Superintendent of Motive Power.

Lackawanna & Pittsburgh.—J. F. O'Brien has been appointed General Manager and Agent for the Receiver. He was recently Assistant General Manager of the East Tennessee, Virginia & Georgia road.

Milwaukee, Lake Shore & Western.—H. F. Whitcomb has been appointed General Superintendent, vice H. G. H. Reed, resigned.

Mineral Range.—C. A. Wright has been appointed General Manager.

Missouri Pacific.—Wm. Kerrigan has been appointed General Superintendent of all lines operated by this company.

New York, Lake Erie & Western.—Robert Gunn has been appointed Master Car-Builder in charge of the Buffalo shops, in place of Milton Wilder resigned.

New York, Texas & Mexican.—M. D. Monserrate is appointed General Manager. He is also President and Superintendent of the Gulf, Western Texas & Pacific road.

Pittsburgh, Cincinnati & St. Louis.—Robert Curtis has been appointed Master Mechanic of the shops at Columbia, O.

Richmond & Danville.—E. B. Thomas (late of the C., C., C. & I. road) has been appointed Second Vice-President and General Manager in place of A. L. Rives resigned.

Texas & St. Louis.—J. W. Brown has been appointed Superintendent of the Missouri & Arkansas Division, in place of W. H. Adams, resigned.

Wisconsin Central.—A. A. Allen is appointed Assistant to the General Manager. F. A. Merrill is appointed Superintendent of the Milwaukee, Eastern and Southern divisions, to succeed Mr. Allen.

Employment.

Wanted.—By a first-class draftsman and practical car-builder, a situation in a railroad car-shop as draftsman or in some other capacity. The advertiser is well acquainted with the construction of sleeping cars, ordinary coaches and other cars; has had long experience, and can furnish the best recommendations. Is a married man. Address F. H. G., office of the National Car-Builder.

How natural it is to try to get *something* for *nothing*, and expect satisfaction in the use of materials that look well but have no real merit. This is exemplified in painting cars as much as anywhere. The Perfect Method Paints manufactured by us insure durability and saving of time otherwise lost in repainting, or loss by decay of the wood and rust of the iron when the paint has perished, as most of the ordinary paint soon does.

THE SHERWIN-WILLIAMS CO.,
CLEVELAND & CHICAGO.

Manuf'rs High Grade Paints and Colors for Railway use.

Established 1856.

Shipman & Bolen, Mfrs. of fine

Railway Varnishes.

Our Varnishes excel in durability,

Newark, New Jersey.

JAMES T. PATTEN,
RAILWAY EQUIPMENT.
REPRESENTING THE

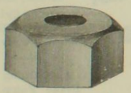
Wason Mfg. Co., of Springfield, Mass.	Portland Company, of Portland, Me.
RAILWAY CARS, ETC.	LOCOMOTIVES.

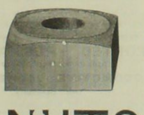
18 BROADWAY (Welles Building), NEW YORK.

Rhode Island Tool Company,

MANUFACTURERS OF

COLD PUNCHED, SQUARE AND HEXAGON





MACHINERY NUTS

Specially Adapted for the Use of Locomotive and Engine Builders and Machinists Generally.

Samples Furnished on Application.

Small Forgings of all Kinds Made to Order.

PROVIDENCE, R. I.

HARTMAN STEEL CO.
(LIMITED),
BEAVER FALLS, PA.

NAIL TRADE FOR MARK NAIL

Our Steel Wire Nails, both Barbed and Smooth, practically cost no more than the old-fashioned cut nails.

THE MANN BOUDOIR CAR.

PRIVACY, LUXURY, COMFORT. PERFECT VENTILATION.

Run regularly on express trains between

NEW YORK AND BOSTON (via Springfield).
N. Y., N. H. & H. and BOSTON & ALBANY Railroads.
Leave New York 10:30 P. M. | Leave Boston 10:30 P. M.
CHICAGO and DETROIT (Niagara Falls Short Line).
WABASH and the BALTIMORE & OHIO RAILROADS.
Leave Chicago 8:45 P. M. | Leave Detroit 9:40 P. M.
CHICAGO & ST. LOUIS, over the WABASH, ST. LOUIS & PACIFIC RAILWAY.
Leave Chicago daily 9:05 P. M. | Leave St. Louis daily 8:00 P. M.
CINCINNATI and LOUISVILLE, over the OHIO & MISSISSIPPI RAILWAY.
Leave Cincinnati 9:10 P. M. | Leave Louisville 1:45 A. M.
BALTIMORE and CINCINNATI, B. & O. R. R., "Limited" Express.
Leave Baltimore 1:30 P. M. | Leave Cincinnati 7:00 P. M.
NEW ORLEANS and CINCINNATI, QUEEN and CRESCENT ROUTE.
Leave New Orleans daily 10:00 A. M. and 10:00 P. M. | Leave Cincinnati daily, 8:30 A. M. and 8:47 P. M.
NEW ORLEANS & ATLANTA.
Leave New Orleans 9:00 P. M. daily. | Leave Atlanta 1:30 P. M. daily.
CINCINNATI and JACKSONVILLE, Fla.
Leave Cincinnati 8:47 P. M. and 8:30 A. M. daily. | Leave Jacksonville 8:50 P. M. and 7:40 A. M daily.
CINCINNATI and VICKSBURG.
Leave Cincinnati 8:30 A. M. and 8:47 P. M. daily. | Leave Vicksburg 8:00 P. M. daily.

DINING CAR SERVICE. NEW YORK and BOSTON (via SPRINGFIELD).

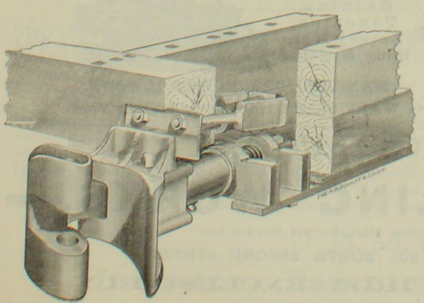
Mann's Boudoir Car Company runs elegant Dining Cars on the trains between New York and Boston, leaving each city at 11:00 A. M. and 4:30 P. M. Mann's Boudoir Car Co. is now prepared to negotiate with railroad companies for placing its cars in regular service on their roads.

PRIVATE CARS.—The cars "Adelina Patti" and "Janauschek," undoubtedly the most magnificent private cars in the world, are TO LET for long or short trips. They are provided with attendants, silver, table and bed linen complete. For further particulars and explanatory books apply to

MANN'S BOUDOIR CAR CO.,
WELLES BUILDING 18 BROADWAY NEW YORK.

THE DOWLING AUTOMATIC SAFETY CAR COUPLER AND BUFFER COMPANY.

THE BEST COUPLER EVER INVENTED.



Will Couple Automatically on a vertical plane on a 19° curve. The Eastern Railroad Association has pronounced our patents valid. Sufficient slack is provided for starting trains. Will not admit snow or ice. The head is made of malleable iron, the knuckle of cast steel. Costs no more than the ordinary link and pin apparatus.

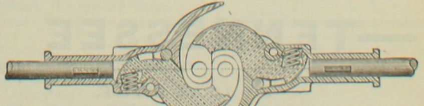
Recommended by the Master Car-Builders' Association after Tests made at Buffalo, 15th, 16th and 17th of September, 1885.

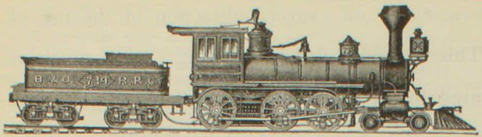
C. D. FIRESTONE, President.

L. C. NEWSOM, Secretary.

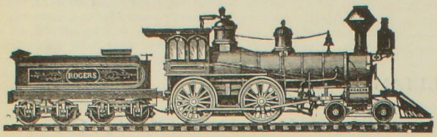
COLUMBUS

OHIO.



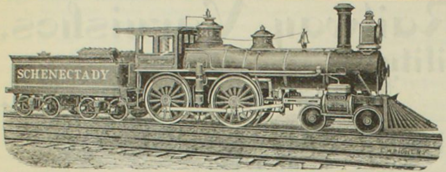


PITTSBURGH LOCOMOTIVE AND CAR WORKS,
PITTSBURGH, PA.
MANUFACTURERS OF
Locomotive Engines for Broad or Narrow Gauge Roads,
From standard designs, or according to specifications, to suit purchasers.
Tanks, Locomotive or Stationary Boilers Furnished at Short Notice
D. A. Stewart, Prest. D. A. Wightman, Supt. Wilson Miller, Sec. & Treas.

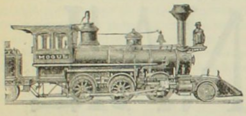


ROGERS LOCOMOTIVE AND MACHINE WORKS,
PATERSON, N. J.
New York Office, 44 Exchange Place.
Manufacturers of Locomotive Engines and Tenders and other Railroad Machinery
J. S. ROGERS, President.
R. S. HUGHES, Secretary. } PATERSON, N. J.
WM. S. HUDSON, Sup't.
R. S. HUGHES, Treas.,
44 Exchange Place, New York.

RHODE ISLAND LOCOMOTIVE WORKS,
PROVIDENCE, RHODE ISLAND.
EARL PHILIP MASON, Vice-President. CHARLES FELIX MASON, President. ARTHUR LIVINGSTON MASON, Secretary.
WILLIAM P. CHAPIN, Treasurer. JOSEPH LYTHGOE, Superintendent. WILLIAM H. FENNER, Jr., Agent.



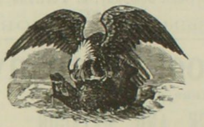
SCHENECTADY LOCOMOTIVE WORKS.
CHAS. G. ELLIS, President. EDWARD ELLIS, Treasurer.
WALTER McQUEEN, Vice-President. A. J. PITKIN, Superintendent.
SCHENECTADY, N. Y.



H. K. PORTER & CO.,
PITTSBURGH, PA.
LIGHT LOCOMOTIVES.
All work steel-fitted and interchangeable. Duplicate parts kept in stock. Illustrated Catalogue mailed on application.

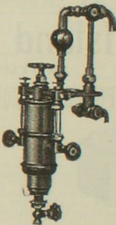
THE ASHTON NOISELESS BLOW-BACK VALVE
Silent Relief to Locomotives.
Waste Steam used to heat Feed Water.
Restrains the use of Shovel.
Large Economy of Fuel.
Our Open-Pop Valve has an unrivaled reputation.
THE ASHTON VALVE CO., 271 Franklin St., Boston, Mass.

W. D. WOOD & CO.'S
Limited.



PATENT PLANISHED SHEET IRON.
Patented March 14, 1865; April 8, 1873; Sept. 9 1873; Oct. 6, 1874; Jan. 11, 1876.
Guaranteed fully equal, in all respects, to the
IMPORTED RUSSIA IRON,
And at a much less price.
LOCOMOTIVE JACKET IRON
Our Specialty.
For sale by all the principal Metal Dealers in the large cities throughout the United States, and at their office,
111 Water Street, Pittsburgh, Pa.

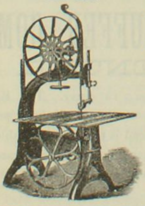
The Seibert Cylinder Oil-Cup Co.,
53 Oliver St., Boston, Mass.,



Manufacturers of
DOUBLE SIGHT-FEED
Locomotive
LUBRICATORS,
Under the Gates, Seibert and other patents,
For Oiling Cylinders Continually, whether Up or Down Grade.
Also, Oiling Air-Brake Pump from One Cup.
Patent Approved by both the Eastern and Western Associations.

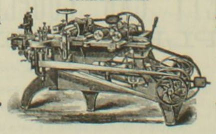
DAMASCUS BRONZE,
Formerly Manufactured by the WESTINGHOUSE MACHINE CO., now made exclusively by the Damascus Bronze Company for BEARINGS for Locomotives, Cars and Machinery.
We would call the attention of Master Mechanics and Master Car-Builders to our
PEERLESS BEARING METAL,
Claiming it to have more Anti-Friction qualities and to be more durable than any Bronze or Brass in the market.
The Metal is for Sale Either in Ingot or Castings.
DAMASCUS BRONZE COMPANY, PITTSBURGH, PA.

BAND SAW.

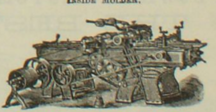


MANUFACTURERS OF WOOD-WORKING MACHINERY.

OUTSIDE MOLDER.



INSIDE MOLDER.



The Latest Improved
MACHINERY
for
Railroad Car Shops.

Planers, Vertical Car Tenoners, Gaining, Tenoning, Rotary Mortising Machines.

C. B. ROGERS & Co., MANUFACTORY, NORWICH, CONN.
WAREROOMS, 109 Liberty St., New York.

EWALD IRON COMPANY,
OWNERS AND OPERATORS OF
—TENNESSEE ROLLING WORKS.—
Tennessee Charcoal Bloom Boiler Plate, Flange, Fire Box, Sheet, Bar and Stay-Bolt Iron.
ST. LOUIS OFFICE, - - - - - 801 NORTH SECOND STREET.
MANUFACTURE CHARCOAL IRON EXCLUSIVELY.

SPEAR'S
SYSTEM OF HEATING AND VENTILATING
RAILWAY COACHES.

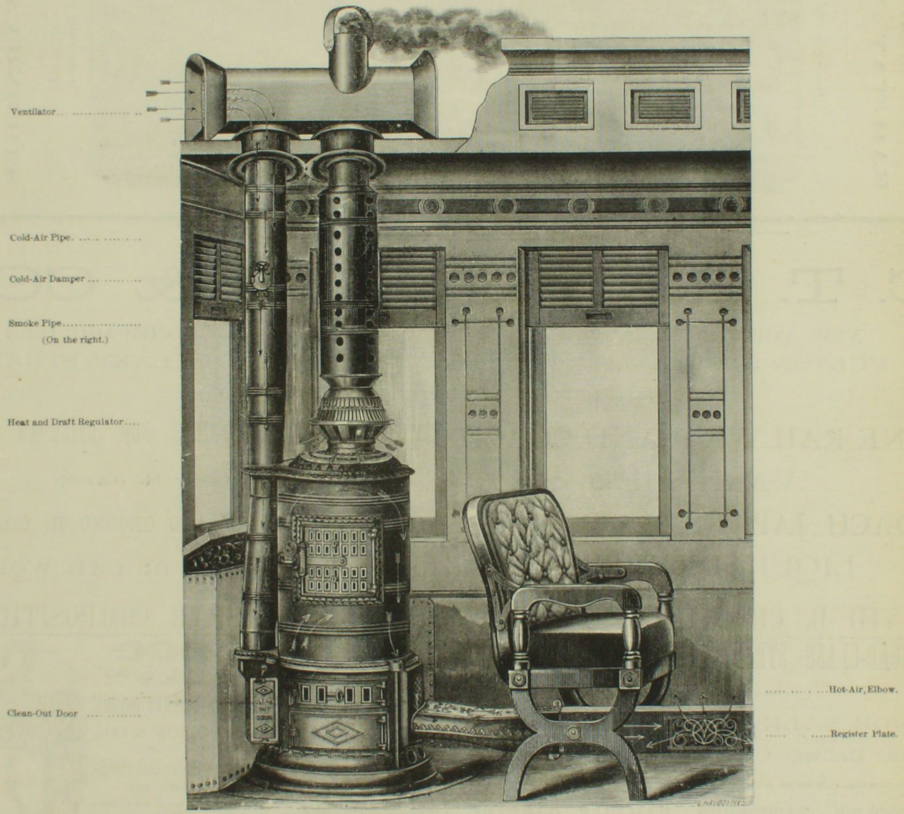

Ventilator
Cold-Air Pipe.
Cold-Air Damper
Smoke Pipe
(On the right.)
Heat and Draft Regulator
Clean-Out Door
Hot-Air, Elbow.
Register Plate.
CLEAN OUT DOOR

ILLUSTRATION OF NO. 16 "A" PATTERN.

SPEAR'S LATEST IMPROVED ANTI-CLINKER CAR HEATER AND VENTILATOR,

WITH NEW HEAT AND DRAFT REGULATOR, NEW CLEAN-OUT DOOR, NEW HOT-AIR ELBOW, AND NEW REGISTER FITTINGS.

Many devices for heating and ventilating railway cars have been tried. Most of them have failed utterly; others are too complicated and too expensive for general use. By our system the fresh air is taken in at the top of the car through the ventilator, passes down a pipe to the base of the stove, around the heated cylinder, and through a 4 × 6 tin pipe along the sides of the car, escaping through register plates beneath the seats, thoroughly heating the car, and forcing the foul air out through the top openings.

The car is thoroughly ventilated, and uniformly heated throughout its length. The entire apparatus is simple, convenient, inexpensive and reliable in all temperatures. SEND FOR ILLUSTRATED CATALOGUE.

JAMES SPEAR,

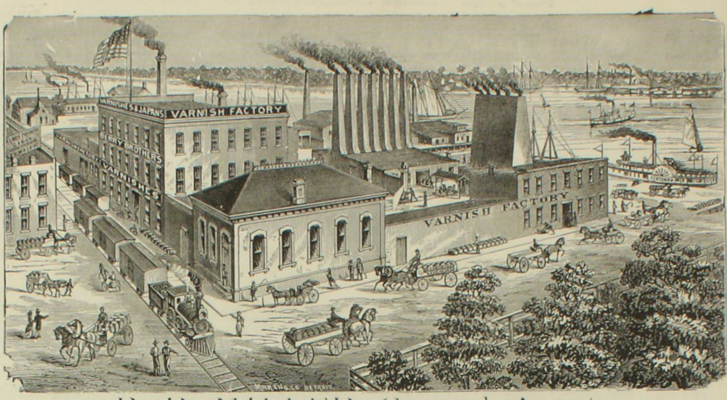
Inventor, Patentee and Sole Manufacturer,

1014 & 1016 MARKET STREET, - - - PHILADELPHIA.

BERRY BROTHERS, DETROIT, MICH., MANUFACTURERS OF RAILWAY VARNISHES.

ESTABLISHED IN 1858.
USE BERRY BROTHERS'
RAILWAY VARNISHES.

Frontage on Wight Street, 218 ft.



Frontage on Lieb Street, 200 ft.

ESTABLISHED IN 1858.
USE BERRY BROTHERS'
RAILWAY VARNISHES.

B. R. MILLER, General Agent.

ESTABLISHED 1770.

C. T. RAYNOLDS & CO.,

NEW YORK:
106 FULTON STREET.

CHICAGO, ILL.:
21 LAKE STREET.

MANUFACTURERS AND IMPORTERS OF

FINE RAILWAY AND COACH VARNISHES,
COACH JAPANS,
LIQUID DRYERS, etc., etc.

SPECIALLY PREPARED PAINTS FOR RAILROAD USE.
COACH COLORS IN JAPAN
PURE COLORS DRY AND GROUND IN OIL.
FINE BRUSHES FOR CAR WORK.

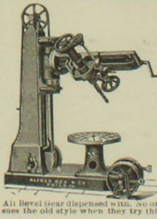
DAVID B. CROCKETT'S "PRESERVATIVE" AND "SPAR COMPOSITION."

SECOND-CLASS STREET RAILWAY CARS FOR SALE

FOR SALE—Twenty second-class 16 foot Street Railway Cars, 5 feet 2 inches gauge.

For particulars call on or address

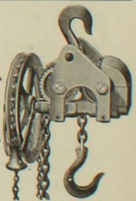
PEOPLE'S PASSENGER RAILWAY COMPANY,
PHILADELPHIA, PENN.



All Bevel Gear dispensed with. No one sues the old style when they try this

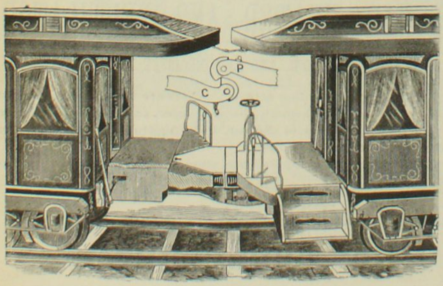
ALL SIZES OF CHAIN TO RUN IN SPOCKET WHEELS.

NORTHERN LIBERTY WORKS.
ALFRED BOX & CO.,
MANUFACTURERS OF
Double Screw Hoists, Radial Drills.
ELEVATORS, ETC.
(Awarded Three Silver Medals and Five Diplomas.)
314 & 316 Green Street,
PHILADELPHIA, PA



2,000 in use. They have equal.

THE COWELL PLATFORM & COUPLING.



The Only Device Forming a CONTINUOUS FLOOR Between Moving Cars, and Making a Solid (Elastic) Train.

The tension of the Buffer Springs is applied *after* coupling the cars; it keeps the buffers *always* together, preventing all jerking in starting and bumping in stopping trains.

The Coupler (like the buffer) works perfectly with the Miller, costs no more, and uncouples easily by the use of one lever only.

The Cowell Freight Coupler is a combined Hook and Link Coupler—automatic in both cases.

It may be seen on the Fitchburg R. R., N. Y. Central, Providence & Worcester, Mich. Central, Valley Ry., N. Y., N. H. & Hartford, etc.

The Passenger device is used on Flint & Pere Marquette, Western & Atlantic, Cincinnati, New Orleans & Texas Pacific, Newburgh, Dutchess & Conn., N. Y. Central, Mann Boudoir Cars and others having trial trains.

Address

THE COWELL PLATFORM AND COUPLING CO.,
CLEVELAND, O.

DIRECTORY

of the Railroads of the United States and Canada, showing the gauge, length of road, number of locomotives and number of cars; and giving the names and titles of their principal officers in charge of the operating, purchasing and rolling stock departments

A

Adirondack R. R. 4-8½ gauge 60 m. 3 lo. 62 cars.
C. E. Durkee, *Supt*..........Saratoga, N. Y.
Jacob Myers, *M. M*..........Saratoga, N. Y.
Jas. J. Traver, *M. C. B*..........Saratoga, N. Y.
Addison & Northern Penn'a Ry. 3 g. 51 m. 5 lo. 50 c.
F. M. Baker, *Gen. Supt*..........Addison, N. Y.
Alabama Great So'n R. R. (*See Cin., N. O. & T. P.*)
Albany & Susquehanna R. R. (*See D. & H. Canal Co.*)
Albemarle & Raleigh R. R. 4-8½ g. 33 m. 3 lo. 35 c.
Jas. H. Petty, *Gen. Supt*..........Tarboro, N. C.
Albert Ry. 4-8½ g. 51 m. 3 lo. 35 cars.
G. A. Robinson, *Man. & Pur. Agt*. Hillsboro, N. B.
Jas. McKay, *M. M. & C. B*..........Hillsboro, N. B.
Alexandria & Fredericksburg Ry. } *See Penna. R. R.;*
Alexandria & Washington R. R. } (7) *Div.*
Allegheny Valley R. R. 4-9 g. 259 m. 70 lo. 2202 c.
David McCargo, *Gen. Supt. & Pur. Agt.*; and
C. B. Price, *Supt.* (Riv. Div.)..........Pittsburg, Pa.
A. A. Jackson, *Supt.* (L.G.Div.). Reynoldsville, Pa.
W. A. Wood, *M. M*..........Verona, Pa.
R. Gunning, *M. C. B*..........Verona, Pa.
Alliance, Niles & Ashtabula R. R. (*See Penna. Co.*)
Annapolis & Elk Ridge R. R. 4-8½ g. 20 m. 4 lo. 29 c.
W. H. Bians, *Supt. & Pur. Agt*..Annapolis, Md.
John L. Beall, *M. Mach*..........Annapolis, Md.
Anniston & Atlantic R. R. 3 g. 9 m.
Tho. K. Scott, *Supt*..........Anniston, Ala.
Antwerp & Paulding R. R. 4-8½ g. 6 m. 4 lo. 63 c.
E. C. Munson, *Gen. Man*..........Antwerp, O.
William Fitzsimmons, Jr., *Pur. Agt*. Antwerp, O.
Arizona & New Mexico Ry. 3 g. 71 m. 3 l. 60 cars.
W. H. Jones, *Gen. Supt. & P. A*. Lordsburg, N. M.
W. C. Boylan, *M. M. & M C. B*. Lordsburg, N. M.
Arkansas Midland R. R. 3-6 g. 63 m. 4 lo. 45 cars.
A. H. Johnson, *Pr. & Gen. Man*...Helena, Ark.
J. B. Johnson, *M. M. & M. C. B*...Helena, Ark.
Arkansas & Louisiana Ry. 4-8½ g. 28 m.
J. D. Beardsley, *Supt*..........Washington, Ark.
Asheville & Spartanburg R. R. 5 g. 49 m. 2 lo. 12 c.
Jas. Andersen, *Supt. & Pur. Agt*..Spart'b'g, S. C.
M. M..........Spartanburg, S. C
Ashland Coal & Iron Ry. 4-8½ g. 22 m. 7 lo. 432 c.
Douglas Putnam, Jr., *Gen. Supt*. Ashland, Ky.
Robt. Peebles, *Pur. Agt*..........Ashland, Ky.
E. M. Roberts, *M. M*..........Ashland, Ky.
Ashtabula & Pittsburgh Ry. (*See Penna. Co.*)
Atchison, Topeka & Santa Fé R. R.
4-8½ g. 2,620 m. 348 lo. 9,629 cars.
A. A. Robinson, *Gen. Man*..........Topeka, Kan.
Geo. Hackney, *Supt. Mach*..........Topeka, Kan.
Clem. Hackney, *Asst. Sup. Mach. Dept*. do.
A. C. Armstrong, *Pur. Agt*..........Topeka, Kan.
Eastern Div.: D. J. Chase, *Supt*..........Topeka, Kan.
Henry Hull, *G. F. Car Dept*..........Topeka, Kan.
John Fagan, *M. M*..........Atchison, Kan.
J. M. Smith, *M. M*..........Kansas City, Mo.
Alfred Taylor, *M. M*..........Emporia, Kan.
Mid. Div.: H. R. Nickerson, *Supt*. Nickerson, Kan.
W. Y. Johnson, *M. M*..........Nickerson, Kan.
W. Div.: C. M. Rathburn, *Supt*..........La Junta, Col.
A. C. Stiles, *M. M*..........La Junta, Col.
D. H. Dotterer, *M. M*..........Raton, N. M.
Las Vegas Div.: Chas. Dyer, *Supt*. Las Vegas, N. M.
F. B. Woodruff, *M. M*..........Las Vegas, N. M.
J. H. Holman, *M. M*..........Wallace, N. M.
Rio Gr. Div.: P. F. Barr, *Supt*. San Marcial, N. M.
E. Hackett, *M. M*..........San Marcial, N. M.
H. P. Olcott, *M. M*..........Deming, N. M.
Geo. A. Hancock, *M. M*..........El Paso, Tex.
Sonora Div.: 265 m.
L. H. Waugh, *M. M*..........Guaymas, Mex.
Kan. Cy., Law. & So. Kan.
4-8½ g. 399 m. 24 lo. 787 c.
J. L. Barnes, *Supt*..........Lawrence, Kan.
T. D. Volk, *M. M*..........Ottawa, Kan.
Atlanta & West Point R. R. (*See Western of Ala.*)
Atlantic & Danville Ry. 3 g. 17 m.
E. G. Sweatt, *Gen. Man*..........Waverly, Va.
Atlantic & North Carolina R. R. (*See Midland; N. C.*)
Atlantic, Tenn. & Ohio R. R. (*See Rich. & Dan.;* (2) *Div.*)
Atlantic & Pacific R. R. 4-8½ g. 575 m.
D. B. Robinson, *Gen. Man*. Albuquerque, N. M.
F. W. Smith, *G. Supt*..........Albuquerque, N. M.
F. P. Wherry, *Pur. Agt*..........St. Louis, Mo.
Geo. Chalender, *Supt. M. P. & M.*, and
Geo. F Chalender, *A. Supt*. Albuquerque, N. M.
B. C. Bosworth, *M. M*..........Coolidge, N. M.
Augusta & Knoxville R. R. (*See Port Royal & Aug.*)
Austin & Northwestern R. R. 3 g. 60 m. 5 lo. 75 c.
J. A. Rhomberg, *Gen. Man*..........Austin, Tex.

B

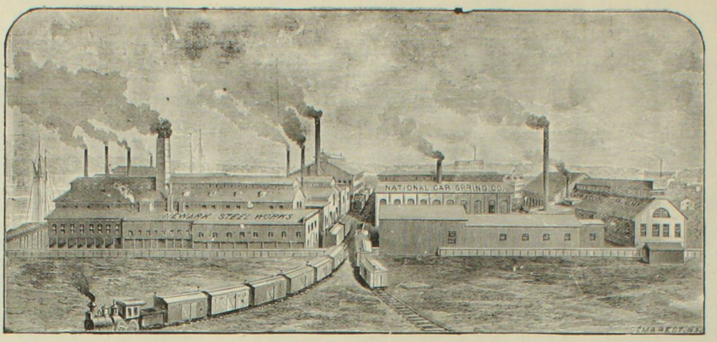
Bachman Valley R. R. (*See Han. Junc., Han. & Gett.*)
Balt. & Delaware Bay R. R. 4-8½ g. 50 m. 2 lo. 13 c.
Fred Gerker, *Gen. M. & P. A*. Chestertown, Md.
Baltimore & Hanover R. R. (*See H. J., H. & G.*)
Baltimore & Ohio R. R.
4-8½ g. 1,612 m. 574 lo. 17,339 cars.
B. Dunham, *Gen. Man*..........Baltimore, Md.
N. S. Hill, *Pur. Agt*..........Baltimore, Md.
Main Stem Div.: 4-8½ g. 972 m.
W. M. Clements, *Gen. Supt*...Baltimore, Md.
A. J. Cromwell, *M. of M*..........Baltimore, Md.
E. W. Grieves, *M. C. B*..........Baltimore, Md.
Andrew Beckett, *M. M*..........Baltimore, Md.
Wm. Edwards, *M. M*...Martinsburg, W. Va.
Sam. Houston, *M. M*..........Piedmont, W. Va.
Robert Maxwell, *M. M*..........Cumberland, Md.
W. P. Harris, *Supt. West of* Cumberland, Md.
S. B. Crawford, *M. M*..........Grafton, W. Va.
Alex. Laird, *M. M*..........Parkersburg, W. Va.
W. B. McClung, *M. M*..........Wheeling, W. Va.
Pitts. Div.: H. P. Harris, *Supt*..........Pittsburgh, Pa
I. N. Kalbaugh, *M. of M*..........Pittsburgh, Pa.
Trans-Ohio Divs.: G. J. Foreacre, *G. Supt*. Newark, O.
W. H. Harrison, *M. of Mach*..........Newark, O.
E. L. Weisgerber, *M. M*..........Newark, O.
H. M. Ingler, *M. M*..........Bellaire, O.
O. B. Perkins, *M. M*..........Zanesville, O.
Thos. Taylor, *M. M*..........Sandusky, O.
F. J. Gunther, *M. M*....Chicago Junction, O.
Chi. Div.: F. H. Britton, *Supt. Trans*. Chicago, Ill.
Benj. Lowther, *M. M*..........Garrett, Ind.
C. H. Campbell, *M. M*..........So. Chicago, Ill
Newark & Straitsville Div.: N. Criswell, Shawnee, O.
Baltimore & Philadelphia. 4-8½ g. 40 m. 7 lo. 35 c.
B. Dunham, *Gen. Man*..........Baltimore, Md.
Jas. McCreighton, *Supt*..........Wilmington, Del.
Baltimore & Potomac R. R. (*See Penna. R. R.;* (7) *Div.*)
Bangor & Piscataquis R. R. 4-8½ g. 63 m. 4 lo. 87 cars.
Arthur Brown, *Supt. & Pur. Agt*..Bangor, Me.
C. S. Nason, *M. M*..........Bangor, Me.
J. W. Comins, *M. C. B*..........Oldtown, Me.
Bangor & Portland Ry. 4-8½ g. 25 m. 3 lo. 3 c.
C. Miller, *Pres. & Gen. Man*...Blairstown, N. J.
Barclay R. R. 4-8½ g. 16 m. 6 l. 200 c.
F. F. Lyon, *Supt*..........Barclay, Pa.
J. A. Hardenburg, *Pur. Agt*..21 Cort. st., N. Y.
Wm. Johnson, *M. M*..........Towanda, Pa.
Batesville & Brinkley R. R. 3 g. 40 m. 3 lo. 42 c.
R. W. Martin, *Pres*..........Little Rock, Ark.
W. J. Thompson, *Gen. Man*..Little Rock, Ark.
Jas. Harrington, *Gen. Supt*..........Brinkley, Ark.
John White, *M. M*..........Brinkley, Ark.
Bath & Hammondsport R. R. 3 g. 10 m.
Allen Wood, *Gen. Man*..Hammondsport, N. Y.
Baton Rouge, Grosse Tête & Opelousas R. R.
5-6 g. 29 m. 3 lo. 12 c.
D. C. Montan, *Gen. Supt*..........Port Allen, La.
Bedford & Bloomfield Ry. 3 g. 43 m. 5 lo. 86 cars.
Jas. W. Kennedy, *Gen. Supt. & Pur. Agt.*; and
Capt. John Thumser, *M. M*..........Bedford, Ind.
Jas. Richards, *M. C. B*..........Bedford, Ind.
Bellaire, Zanesville & Cin. Ry. Co. 3 g. 112 m 5 lo. 71 c
S. L. Mooney, *Pres. & Gen. Man*. Woodsfield, O.
C. E. Hill, *M. M*..........Zanesville, O.
Bell's Gap R. R. 4-9 g. 25 m. 5 lo. 148 cars.
R. G. Ford, *Supt. & Pur. Agt*....Bellwood, Pa.
Geo. Van Brunt, *M. M*..........Bellwood, Pa.
A. Zimmerman, *M. C. B*..........Bellwood, Pa.
Belt R. R. 4-8½ g. 12 m. 10 lo.
W. P. Ijams, *Supt*..........Indianapolis, I
Belt Ry. 4-8½ g. 27 m
Jas. D. Carson, *Gen. Man*..........Chicago, Ill.
R. W. Johnson, *M. M*..........Chicago, Ill.
Bennington & Glastonbury. 4-8 g. 10 m.
R. C. Root, *Pres*..........Bennington, Vt.
Bennington & Rutland Ry. 4-8½ g. 59 m. 10 lo. 236 c.
E. D. Bennett, *Supt. & Pur. Agt*. Bennington, Vt.
Chas. McMasters, *M. M*..........Rutland, Vt.
Berlin Branch R. R. (*See Han. Junc., Han. & Gett.*)
Bladen, Columbus & Florida. 4-8½ g. 16 m. 2 lo. 2 c.
John Colville, *Pres*..........Wilmington, N. C.
Bodie & Benton Ry. & Com. Co. 3 g. 34 miles.
Thomas Holt, *Supt. & Pur. Agt*..........Bodie, Cal.
E. H. Barton, *M. M. & C. B*..........Bodie, Cal.
Boston, Barre & Gardner. 4-8½ g. 37 m. 8 lo. 108 c.
Supt. & P. A..Worcester, Mass.
Frank I. Goodwin, *M. M*..........Worcester, Mass.
Boston, Hoosac Tunnel & W'n Ry.
4-8½ g. 87 m. 18 lo. 1,038 cars.
H. L. Merrill, *Gen. Man*..Mechanicsville, N. Y.
C. H. Cory, *Pur. Agt*....Mechanicsville, N. Y.
C. H. Cory, *Supt. & M. M*. Mechanicsville, N. Y.
John S. Ellis, *M. C. B*.....Mechanicsville, N. Y.
Boston, Revere Beach & Lynn R. R. 3 g. 9 m. 7 lo. 55 c.
C. A. Hammond, *Supt. & P. Agt*. Boston, Mass.
R. D. Sutherland, *M. M*..........Boston, Mass.
John Coghlan, *M. C. B*..........Boston, Mass.
Boston, Winthrop & Point Shirley R. R.
3 g. 10 m. 1 lo. 8 c.
C. A. Parks, *Supt*..........Boston, Mass.
J. W. Davis, *M. M*..........Winthrop, Mass.
Boston & Albany R. R. 4-8½ g. 372 m. 245 lo. 6,111 c.
W. H. Barnes, *Gen. Man*..........Boston, Mass.
Edw. Gallup, *Gen. Supt*..........Springfield, Mass.
A. B. Underhill, *Supt. M. P*...Springfield, Mass.
F. D. Adams, *Gen. M. C. B*..........Allston, Mass.
J. T. Chamberlain, *For. C. Shop*. Allston, Mass.
H. B. Chesley, *Div. Supt*..........Boston, Mass.
G. H. Colby, *Div. M. M*..........Boston, Mass.
C. E. Grover, *Div. Supt*....Springfield, Mass.
H. W. Eddy, *Div. M. M*....Springfield, Mass.
J. B. Weston, *For. Car Sh*. Springfield, Mass.
W. H. Russell, Jr., *Div. Supt*. E. Albany, N. Y.
T. B. Purvis, *Div. M. M*...East Albany, N. Y.
J. E. Doran, *For. Car Sh*..East Albany, N. Y.
Boston & Lowell R. R.
4-8½ g. 555 m. 147 lo. 3,262 cars.
C. S. Mellen, *Gen. Supt*..........Boston, Mass.
F. H. Nourse, *Pur. Agt*..........Boston, Mass.
Jas. K. Taylor, *Supt. R. S. & M*. Concord, N. H.
So. Div.: J. F. Crockett, *Supt*..........Boston, Mass.
H. S. Kolseth, *M. M*..........Boston, Mass.
No. Div.: Geo. A. Todd, Supt...Concord, N. H.
Geo. E. Shepard, *Pur. Agt*....Concord, N. H.
C. C. Aspinwall, *M. M*..........Concord, N. H.
Wh. Mt. Div.: W. A. Stowell, *Supt*. Woodsville, N. H.
Geo. A. Ferguson, *M. M*...Lake Village, N. H.
Boston & Maine R. R. 4-8½ g. 491 m. 209 lo. 4,660 c.
J. T. Furber, *Gen. Man*..........Boston, Mass.
Geo. J. Fisher, *Pur. Agt*..........Boston, Mass.
Wm. Smith, *Supt. M. P*..........Boston, Mass.
D. C. Richardson, *M. C. B*.....Lawrence, Mass.
West. Div.: Wm. Merritt, Jr., *Supt*. Boston, Mass.
East. Div.: D. W. Sanborn, *Supt*..Boston, Mass.
North Div.:
J. W. Sanborn, *Supt*..Wolfboro Junc., N. H.
Boston & N. Y. Air Line R. R. (*See N. Y., N. H. & H.*)
Boston & Providence R. R. 4-8½ g. 67 m. 52 lo. 1,006 c.
A. A. Folsom, *Gen. Supt. & P. A*. Boston, Mass
Geo. Richards, *M. M*..........Roxbury, Mass.
Jno. Lightner, *M. C. B*..........Roxbury, Mass.
Bowling Green & Toledo R. R. 4-8½ g. 6 m. 2 lo. 4 c.
Wm. A. Wiggins, *Gen. Man*. Bowling Green, O.
Wm. A. Wiggins, *Pur. Agt*..Bowling Green, O.
Bradford, Bordell & Kinzua R. R. 3 g. 42 m. 6 lo. 82 c.
Bradford, Eldred & Cuba. 3 g. 54 m. 6 l. 158 c.
Tonawanda Valley & Cuba. 3 g. 60 m. 5 lo. 31 c.
J. V. D. Loomis, *Supt*..........Attica, N. Y.
Jno. Delaney, *M. M. & C. B*..........Bradford, Pa.
Brattleboro' & Whitehall R. R. 3 g. 36 m. 3 lo. 56 c.
(*Operated by Central Vermont.*)
Bridgton & Saco River R. R. 2 g. 16 m. 2 lo. 19 c.
Wm. F. Perry, *Gen. Supt*..........Bridgton, Me.
M. M. Caswell, *M. M. & Pur. Agt*. Bridgton, Me.
Brighthope Ry. 3 g. 37 m. 4 lo. 193 cars.
Jas. R. Worth, *Supt*..........Richmond, Va.
P. M. Buckingham, *Pur. Agt* Richmond, Va.
A. Gary, *Supt. Way & Works*. Winterpock, Va.
Robt. Kredell, *M. M*..........Chester, Va.
Brooklyn, Bath & Coney Island R. R.
4-8½ g. 7 m. 8 lo. 36 cars.
Geo. A. Gunther, *Gen. Man*...Brooklyn, N. Y.
Aug. Wolff, *M. M*..........Brooklyn, N. Y.
Brooklyn, Flatbush & Coney Island Ry.
4-8½ g. 8 m. 8 lo. 54 c.
J. L. Morrow, *Supt. & P. A*...Brooklyn, N. Y.
Wm. Finley, *M. M*..........Brooklyn, N. Y.
Brooklyn & Rockaway Beach R. R.
4-8½ g. 3 m. 2 lo. 18 cars.
Wm. Warner, *Supt*..........East New York, N. Y.
Brunswick & Western R. R. 5 g. 172 m. 13 lo. 170 c
A. A. Gaddis, *Gen. Man. & P. A*. Brunswick, Ga.
J. K. Nightengale, *Pur. Agt*...Brunswick, Ga.
W. R. Kline, *M. M*..........Brunswick, Ga.
Buff., N. Y. & Phil. R. R. 3 & 4-8½ g. 655 m. 120 l. 6,339 c.
Geo. S. Gatchell, *Gen. Supt*..........Buffalo, N. Y.
W. W. Halsey, *Asst. to G. Supt*..Buffalo, N. Y.
Allen Vail, *M. M*..........Buffalo, N. Y.
Buff. Div.: Henry Dwyer, *Supt*....Buffalo, N. Y.
Roch. Div.: J. R. Watson, *Supt*..........Olean, N. Y.
Pitts. Div.: E. H. Witter, *Supt*..........Oil City, Pa.
H. J. Bookhammer, *M. M*..........Oil City, Pa.
C. E. Turner, *M. M*..........Olean, N. Y.
Burlington, Cedar Rapids & Northern Ry.
4-8½ g. 989 m. 96 lo. 4,206 cars.
C. J. Ives, *Pres. & Gen. Supt*. Cedar Rapids, Ia.
Robt. Williams, *V. P. & G. Supt*. Cedar Rapids, Ia.
T. Stickney, *Pur. Agt*..........Cedar Rapids, Ia.
R. W. Bushnell, *M. M. & C. B*. Cedar Rapids, Ia.
Burlington & Lamoille R. R. 4-8½ g. 35 m. 4 lo. 64 c.
G. L. Linsley, *Gen. Man. & Supt*. Burlington, Vt.
F. G. Brownell, *M. M*..........Burlington, Vt.
Burlington & Mo. Riv. R. R. (in Neb.) (*See C. B. & Q.*)
Burlington & North-West'n Ry. 3 g. 38 m. 3 lo. 97 c.
Burlington & Western R. R. 3 g. 15 m. 38 c.
E. S. Edger, *Supt*..........Burlington, Ia.
Burlington & Ohio River R. R. 4-8½ g.
R. Tanner, *Pur. Agt*..........Chicago, Ill.

C

California Northern R. R. 4-8½ g. 26 m. 2 lo. 17 c.
Andrew J. Binney, *Gen. Man*..Marysville, Cal.
California Southern R. R. 4-8½ g. 127 m. 13 lo. 301 c.
J. N. Victor, *Supt*..........National City, Cal.
J. M. Keith, *M. M*..........National City, Cal.
Camden & Atlantic R. R. (*See Penna. R. R.;* (2) *Div.*)
Canada Southern Ry. (*See Mich. Cen.;* (2) *Div.*)
Canada Atlantic Ry. 4-8½ g. 135 m.
D. C. Linsley, *Man*..........Ottawa, Ont.
M. Donaldson, *M. M*..........Ottawa, Ont.
Canadian Pacific R. R. 4-8½ g. 1,742 m. 118 l. 2,726 c
W. C. Van Horne, *Gen. Man*....Montreal, Can.
Francis R. F. Brown, *Mech. Supt*. Montreal, Can.
T. G. Shaughnessy, *Asst. G. M*., Montreal, Can
Alex. C. Henry, *Pur. Agt*..........Montreal, Can.
E. Div.: *Gen. Supt*. Montreal, Can.
W. Div.: J. M. Egan, *Gen. Supt*..Winnipeg, Man.
Ontario Div.: W. White, *Gen. Supt*. Montreal, Can.
Cape F'r & Yadkin Val. R. R. 4-8½ g. 112 m. 7 lo. 60 c.
W. M. S. Dunn, *Gen. Supt*...Fayetteville, N. C.
Isaac W. Clark, *M. M. & C. B*..Fayetteville, N. C.
Cape Girardeau Southwestern Ry.
4-8½ g. 52 m. 3 lo. 51 cars.
Louis Houck, *Gen. Man*..Cape Girardeau, Mo.
W. A. Penney, *Supt*..........Cape Girardeau, Mo.
D. L. Meyers, *Pur. Agt*....Cape Girardeau, Mo.
Fred Glover, *M. M*..........Cape Girardeau, Mo.
Carolina Central R. R. (*See Ral. & Aug.*)
Carillon & Grenville Ry. 5-6 g. 13 m.
R. W. Shepard, *Pres*..........Montreal, Can.
Carson & Colorado R. R. (*See Va. & Truckee*).
Catasauqua & Fogelsville. 4-8½ g. 25 m. 6 lo. 581 c.
C. W. Chapman, *Supt. & P. A*. Catasauqua, Pa.
J. Thomas, *M. M*..........Hokendauqua, Pa.
Chas. J. Holbach, *M. C. B*...Catasauqua, Pa.
Catskill Mountain R. R. 3 g. 16 m. 2 lo. 26 cars.
Charles A. Beach, *Supt*..........Catskill, N. Y.
Cazenovia, Canastota & De Ruyter. (*See U., I. & E.*)
Central and South-Western Railroads (Ga.).
5 g. 1,115 m. 145 lo. 2,008 cars.
W. G. Raoul, *Pres*..........Savannah, Ga.
Wm. Rogers, *Gen. Supt*..........Savannah, Ga.
C. H. Carson, *Pur. Agt*..........Savannah, Ga.
Cen. Div.: D. D. Arden, *M. M*.....Savannah, Ga.
T. F. Warwick, *M. M*..........Augusta, Ga.
F. Devine, *M. C. B*..........Savannah, Ga.
So.-West'n Div.: T. D. Kline, *Supt*....Macon, Ga.
D. M. Gugel, *M. M*..........Macon, Ga.
S. A. Charpiot, *M. C. B*..........Macon, Ga.
Central R. R. of N. J. (*See Phil. & Read.; N. J. Cen. Div.*)
Central American & Pacific Ry. 3 g. 67 m. 1 lo. 11 c
W. C. Fitzsimmons, *Gen. Supt*..Escuintla, Guat.
Central Branch Union Pac. (*See Mo. Pac.;* (3) *Div.*)
Central Iowa Ry. 4-8½ g. 412 m. 50 lo. 2,313 cars.
E. L. Dudley, *Supt*..........Marshalltown, Ia.
J. G. Johnston, *Asst. Supt*....Marshalltown, Ia.
D. D. Phelps, *Asst. Supt*..........Monmouth, Ill.
C. H. Ackert, *Pur. Agt*..........Marshalltown, Ia.
John Player, *M. M. & M. C. B*. Marshalltown, Ia.
Central Ontario Ry. 4-8½ g. 33 m. 4 lo. 66 cars.
J. B. McMullen, *Gen. Man*..........Picton, Ont.
James Falconar, *M. M*..........Trenton, Ont.
Central Pac. R. R. 4-8½ g. 4,303 m. 382 lo. 11,260 c.
A. N. Towne, *Gen. Man*....San Francisco, Cal.
J. A. Fillmore, *Gen. Supt*...San Francisco, Cal.
R. H. Pratt, *A. G. Supt*....San Francisco, Cal.
J. R. Watson, *Gen. Pur. Agt*..Sacramento, Cal.
A. J. Stevens, *Gen. M. M*.....Sacramento, Cal.
W. McKenzie, *Asst. G. M. M*..Sacramento, Cal.
Benj. Welch, *Gen. M. C. B*....Sacramento, Cal.
G. J. Turner, *Asst. G. M. C. B*. Sacramento, Cal.
Western: Visalia & Tulare Divs. and Northern Ry.
A. D. Wilder, *Supt*..........W. Oakland, Cal.
G. D. Welch, *M. M.* (W. Div.) W. Oakland, Cal.
W. B. Ludlow, *M. C. B.* (W. Div.) do.
S. Johnson, *M. M.* (T. Div.)..........Tulare, Cal.
J. B. Wright, *Supt*..........Sacramento, Cal.
M. W. Cooley, *M. M.* (*S. Div.*)..Rocklin, Cal.
Truckee Div.: J. H. Whited, *Supt*. Wadsworth, Nev.
Geo. Gregg, *M. M*..........Wadsworth, Nev.
Wm. McPherson, *F. Car Sh*..Wadsworth, Nev.
Humb't Div.: G. W. Coddington, *Supt*. Carlin, Nev.
W. F. Smith, *M. M*..........Carlin, Nev.
J. C. Doughty, *For. Car Sh*..........Carlin, Nev.
Salt Lake Div.: A. G. Fell, *Supt*.....Ogden, Utah.
James Lamb, *M. M*..........Terrace, Utah.
A. Sherburne, *For. Car Sh*..........Ogden, Utah.
St. & Cop. R. R.: R. L. Myrick, *Supt*..Stockton, Cal.
Los Angeles; and Yuma Divs. (So. Pac.):
E. E. Hewitt, *Asst. Supt*....Los Angeles, Cal.
James Velsir, *M. M*..........Los Angeles, Cal.
T. T. Gilleland, *For. Car Sh*. Los Angeles, Cal.
Arizona Divs. (So. Pac.):
J. A. Muir, *Asst. Supt*..........Tucson, Ariz.
W. F. Smith, *M. M*..........Tucson, Ariz.
Rio Grande (S. Pac.) & El Paso (G. H. & S. A.) Divs.:
C. B Seymour, *Supt*..........El Paso, Texas.
J. L. Bonner, *M. M*..........El Paso, Texas.
H. C. Standish, *For. Sh*.....El Paso, Texas.
Central Texas & N'w'n R. R. (*See Hous. & Tex. Cen.*)
Central Vermont R. R. 4-8½ g. 864 m. 185 lo. 2,789 c.
J. W. Hobart, *Gen. Man*..........St. Albans, Vt.
J. M. Foss, *Gen. Supt*..........St. Albans, Vt.
W. J. Robertson, *Supt. M. P*....St. Albans, Vt.
No. Div.: I. B. Futvoye, *Supt*.....St. Johns, P. Q.
Rut. Div.: J. Burdett, *Supt*..........Rutland, Vt.
N. L. Davis, *M. M. & C. B*..........Rutland, Vt.
Brattleboro & Whitehall R. R., and
Brat. Div.: E. F. Brooks, *Supt*...Brattleboro, Vt.
New London No'n R. R. 143 m. 22 lo. 303 c.
C. F. Spaulding, *Supt. & P. A*. New London, Ct.
I. N. Dow, *M. M*..........New London, Ct.
S. O. Banks, *M C B*..........New London, Ct.
Chagrin Falls & Southern R. R. 3 g. 6 m. 1 lo. 12 c.
W. Hutchings, *Gen. Man*.....Chagrin Falls, O.
J. W. Williams, *Gen. Supt*....Chagrin Falls, O.
Charleston & Savannah Ry. 5 g. 115 m. 15 lo. 200 c.
H. S. Haines, *Gen. Man*..........Savannah, Ga.
C. S. Gadsden, *Gen. Supt*......Charleston, S. C.
H. A. Ulmo, *M. M*..........Savannah, Ga
Charlotte, Columbia & Augusta R. R. (*See Rich. & D.*)
Chateaugay R. R. 3 g. 34 m. 8 lo. 380 cars.
A. L. Inman, *Gen. Man*..........Plattsburg, N. Y.
J. M. Davies, *Supt*.......Lyon Mountain, N. Y.
M. L. French, *Asst. Supt*....Plattsburg, N. Y.
Chatham Ry. 4-8½ g. 9 m.
J. B. Snowball, *Man*..........Chatham, N. B.
Chattaroi Ry. 4-8½ g. 51 miles 11 loco. 483 cars.
J. H. Northrop, *Gen. Man. & P. A*. Ashland, Ky.
J. R. Martin, *M. M*..........Ashland, Ky.
Joseph P. Burleigh, *M. C. B*..........Ashland, Ky.
Cheraw & Chester R. R. (*See Rich. & Dan.;* (2) *Div.*)
Cheraw & Darlington R. R. (*See Wil. & Wel.*)
Cheraw & Salisbury R. R. (*See Wil. & Wel.*)
Cherokee R. R. (*See East & West.*)
Cherry Valley R. R. 4-8½ g. 6 m. 3 lo. 6 cars.
E. T. Herndon, *Supt*..........Midland, Mo.
Chesapeake, Ohio & South-Western.
4-9 g. 398 m. 62 lo. 1,345 c.
Jas. L. Frazier, *Supt*..........Louisville, Ky.
H. E. Huntington, *Pur. Agt*.....Louisville, Ky.
J. A. Dew, *Mast. Trans*..........Paducah, Ky.
R. H. Briggs, *Supt. M. P*..........Paducah, Ky.
D. L. Weaver, *M. M*......Elizabethtown, Ky.
Jno. Fitzgerald, *M. M*..........Paducah, Ky.
Chesapeake & Ohio Ry. 4-9 g. 642 m. 181 l. 5,611 c.
C. W. Smith, *Gen. Man*..........Richmond, Va.
D. A. Sweet, *Asst. to Gen. Man*. Richmond, Va.
A. S. Emmons, *Pur. Agt*..........Richmond, Va.
T. L. Chapman, *Supt. M. P*..........Richmond, Va.
Eastern Div.: A. H. Wood, *Supt*..Richmond, Va.
J. N. King, *M. C. B*..........Richmond, Va.
C. F. Thomas, *M. M*..........Richmond, Va.
Hunt. Div.: E. H. Barnes, *Supt*..Hinton, W. Va.
W. T. Smith, *M. M*....Huntington, W. Va.
H. C. Bassinger, *M. C. B*. Huntington, W. Va.
Lex. Div.: J. D. Yarrington, *Supt*..Lexington, Ky.
W. T. Smith, *M. M*.....Huntington, W. Va.
Ky. Cent. Div. 4-9 g. 250 m. 27 l. 610 c.
H. E. Huntington, *Supt*..........Covington, Ky.
S. R. Tuggle, *M. M*..........Covington, Ky.
Cheshire R. R. 4-8½ g. 80 m. 31 lo. 531 cars.
R. Stewart, *Gen. Man*..........Keene, N. H.
H. H. Stone, *Pur. Agt*..........Keene, N. H.
F. A. Perry, *M. M*..........Keene, N. H.
A. E. Howard, *M. C. B*..........Keene, N. H.
Chester & Lenoir Ry. (*See Rich. & Dan.;* (3) *Div.*)
Chicago, Bur. & Kan. City Ry. (*See C. B. & Q.*)
Chicago, Burlington & Quincy R. R.
4-8½ g. 3,608 m. 545 lo. 21,012 cars.
H. B. Stone, *Gen. Man*..........Chicago, Ill.
(1) C., B. & Q., East of Mo. Riv.
J. D. Besler, *Gen. Supt*..........Chicago, Ill.
Wm. Irving, *Gen. Pur. Agt*..........Chicago, Ill.
G. W. Rhodes, *Supt. M. P*..........Aurora, Ill.
Wm. Forsyth, *Mech. Eng*..........Aurora, Ill.
Ill. Divs.: C. F Resseguie, *Supt*....Galesburg, Ill.
Chi. Div., Geo. Alexander, *Supt*...Aurora, Ill.
L. E. Johnson, *M. M*..........Aurora, Ill.
Galesburg Div.: F. C. Rice, *Supt*. Galesburg, Ill.
Robert Colville, *M. M*..........Galesburg, Ill.
St. L. Div.: W. C. Brown, *Supt*..Beardstown, Ill.
A. Forsyth, *M. M*..........Beardstown, Ill.
Ia. & Mo. Divs.: W. F. Merrill, *Supt*. Burlington, Ia.
East. Div.: O. E. Stewart, *Supt*..Burlington, Ia.
Joel West, *M. M*..........Burlington, Ia.
Mid. Div.: J. B. Maxon, *Supt*.....Ottumwa, Ia.
West'n Div.: J. H. Duggin, *Supt*....Creston, Ia
C. W. Eckerson, *M. M*..........Creston, Ia.
Chi., B. & Kan. C'y and St. L., Keo. & No.-W'n Rys.
Robt. Law, *Gen. Supt*..........Keokuk, Ia.
W. H. Bartlett, *M. M*..........Burlington, Ia.
(2) C. B. & Q., West of Mo. Riv.
G. W. Holdrege, *Gen. Man*.......Omaha, Neb.
C. M. Wead, *Supply Agt*..........Omaha, Neb.
D. Hawksworth, *M. M*........Plattsmouth, Neb.
C. M. Wead, *Storek'pr*..........Plattsmouth, Neb.
Bur. & Mo. Riv. & Neb. Ry. Divs.:
T. E. Calvert, *Gen Supt*..........Lincoln, Neb.
D. E. Thompson, *Supt*..........Lincoln, Neb.
E. Bignell, *M. M*..........Lincoln, Neb.
R. V. Div.: A. Campbell, *Supt*......McCook, Neb.
A. & N. Div.: J. McConniff, *Supt*...Lincoln, Neb
Chicago, Fairchild & Eau Claire R. R.
4-8½ g. 22 m. 4 lo. 28 cars.
N. C. Foster, *Gen. Man*..........Fairchild, Wis.
C. I. Wickersham, *Pur. Agt*..........Chicago, Ill.
Chicago, Iowa & Dakota Ry. 4-8½ g. 26 m
John Porter, *Gen Man*..........Eldora, Ia.
Chicago, Milwaukee & St. Paul R. R.
4-8½ g. 5,201 m. 626 lo. 19,018 cars.
Roswell Miller, *Gen. Man*....Milwaukee, Wis.
Jos. F. Tucker, *Asst. Gen. M*..Milwaukee, Wis.
J. T. Clark, *Gen. Supt*..........Milwaukee, Wis.
A. J. Earling, *Asst. Gen. Supt*. Milwaukee, Wis.
J. T. Crocker, *Pur. Agt*..........Milwaukee, Wis.
J. M. Lowry, *Gen. M. M*..........Milwaukee, Wis
E. Fairbairn, *M. M*..........Milwaukee, Wis
John Baillie, *Supt. Car Dept*...Milwaukee, Wis
W. E. Kittridge, *M. C. B*..........Milwaukee, Wis
(1) C. & M. and C. & C. B. in Ill.:
G. O. Clinton *Supt*..........Chicago, Ill
Ch. & C. B in Ia.:
R. B. Campbell, *Supt*..........Marion, Wis
La C. & Wis. Val. Divs.:
W. G. Collins, *Supt*..........Milwaukee, Wis
P. du C. & M. Pt. Divs.:
S. J. Collins, *Supt*..........Milwaukee, Wis.
(2) C. H. Prior, *Asst. Gen. Supt*..Minneapolis, Minn.
H. & D. Div.: W. M. Kellie, *Supt*. do.
J. O. Pattie, *M. M*..........Minneapolis, Minn.
Ia. & Minn. Div.: E. H. Graves, *Supt*. do.
S. Minn. Div.: H. R. Williams, *Supt*. Lacrosse, Wis.
Riv. & Dub. Divs.: C. W. Case, *Supt*. Dubuque, Ia.
S. Charnley, *M. M*..........Dubuque, Ia.
Ia. & Da. Div.: F. D. Underwood, *Supt*. Ma'n C'y, Ia.
S. Cy. & Da. Div.: W. J. Underwood, *Supt*. Sioux Cy, Ia.
F. H. Moulton, *M. M*..........Yankton, Dak.
J. M. Horan, *For*..........Yankton, Dak.
(3) D. A. Olin, *Asst. Gen. Supt*..........Racine, Wis.
R. & S. W. Divs.: D. L. Bush, *Supt*...Racine, Wis.
John Taylor, *M. M*..........Racine, Wis
(4) Northern Div.: L. B. Rock, *Supt*. Milwaukee, Wis.
Wm. E. Kittredge, *M. C. B*..Milwaukee, Wis
Chicago, Rock Island & Pac. Ry.
4-8½ g. 1,381 m. 309 lo. 8,367 cars.
R. R. Cable, *Pres. & Gen. Man*....Chicago, Ill.
E. St. John, *Asst. Gen. Man*..........Chicago, Ill.
A. Kimball, *V. P. & Gen. Supt*.....Chicago, Ill
H. F. Royce, *Asst. G. Supt*..........Davenport, Ia.
F. A. Marsh, *Pur. Agt*..........Chicago, Ill.
T. B. Twombly, *Gen. M. M*..........Chicago, Ill.
B. K. Verbryck, *Gen. M. C. B*..........Chicago, Ill.
Ill. Div.: R. H. Chamberlin, *Supt*.....Chicago, Ill.
R. Biester, *M. M*..........Chicago, Ill.
Sam'l Pullman, *M. C. B*..........Chicago, Ill.
Ia. Divs.: Jno. Given, *Supt*..........Des Moines, Ia.
J. G. Crockett, *M. M*..........Stuart, Ia.
Jas. E. Morrill, *M. M*..........Davenport, Ia.
Chas. M. Leonard, *M. C. B*......Davenport, Ia.
K. & Des. M. Div.: Jno. Given, *Supt*. Des Moines, Ia.
S. W. Wakefield, *M. M*..........Keokuk, Ia.
Henry Kummer, *M. C. B*..........Keokuk, Ia.
So.-Wn. Div.: G. F. Walker, *Supt*....Trenton, Mo.
R. O. Carscadin, *M. M*..........Trenton, Mo.
Chas. R. Best, *M. C. B*..........Trenton, Mo.
Chicago, Saginaw & Canada R. R. (*See Det., L. & N.*
Chicago, St. Louis & New Orleans R. R. (*See Ill. Cen.*
Chicago, St. Louis & Pittsburgh R. R.
4-9 g. 635 m. 202 lo. 3,510 cars.
James McCrea, *Manager*..........Columbus, O.
Wm. Mullins, *Gen. Pur. Agt*...Pittsburgh, Pa
Edward B. Wall, *Supt. M. P*....Columbus, O
1, 3 & 5 Divs.: J. F. Miller, *Supt*. Richmond, Ind
Robert Curtis, *M. M*..........Columbus, O
J. L. Copeland, *G. F Car Shops*. Columbus, O
Wm. Swanston, *M. M*.....Indianapolis, Ind.
W. C. Arp, *Gen. For*.......Indianapolis, Ind.
2 & 4 Divs.: Chas. Watts, *Supt*. Logansport, Ind.
W. W. Reynolds, *M. M*.....Logansport, Ind.
Chas. H. Starr, *G. F. C. Shops*, Logansport, Ind.
Chicago, St. Louis & Wn. R. R. 4-8½ g. 152 m. 11 lo. 1,799 c.
F. E. Hinckley, *Gen. Man*..........Chicago, Ill.
B. T. Lewis, *Pur. Agt*..........Chicago, Ill.
A. H. Crocker *Supt*..........Streator, Ill
J. N. Chilson, *M. C. B*..........Streator, Ill
Chicago, St. Paul, Minneapolis & Omaha Ry.
4-8½ g. 1,301 m. 181 lo. 5,459 cars.
J. M. Whitman, *Gen. Supt*......St. Paul, Minn.
W. H. S. Wright, *Pur. Agt*......St. Paul, Minn.
Matt. Ellis, *M. M*..........St. Paul, Minn.
J. J. Ellis, *Asst. M. M*..........St. Paul, Minn
H. L. Preston, *M. C. B*..........Hudson, Wis
Ea. & No. Div.: A. A. Hobart, *Supt*. St. Paul, Minn
St. Paul and Sioux City Div.:
H. Spencer, *Supt*..........St. James, Minn.
H. C. Anderson, *Asst. M. M*....Sioux Cy, Ia.
Neb. Div.: Jas. McCabe, *Supt*......Omaha, Neb.
Chicago & Alton R. R. 4-8½ g. 849 m. 213 lo. 6,168 c.
C. H Chappell, *Gen. Man*..........Chicago, Ill.
T. M. Bates, *Supt. of Trans*...Bloomington, Ill.
A. V. Hartwell, *Pur. Agt*..........Chicago, Ill.
Wm. Wilson, *Supt. of Mach*...Bloomington, Ill.
Jos. Townsend, *G. For. Car Dept*. do.
Chi. Div.: A. M. Richards, *Supt*. Bloomington, Ill.
St. L. & K. C Div.: S. D. Reeves, *Supt*. Roodhouse, Ill.
Wm. Hill, *M. M*..........Slater, Mo.
Chicago & Atlantic Ry. 4-8½ g. 269 m.
F. Broughton, *Gen. Man*..........Chicago, Ill
J. H. Parsons, *Supt*..........Chicago, Ill.
C. J. Domville, *M. M*..........Huntington, Ind.
Chi. & East'n Ill. 4-8½ g. 252 m. 56 lo. 3,870 cars.
O. S. Lyford, *Gen. Supt*..........Chicago, Ill.
D. R. Patterson, *Pur. Agt*..........Chicago, Ill.
P. W. Drew, *M. Trans*..........Chicago, Ill.
Allen Cooke, *M. M*..........Danville, Ill.
Chicago & Grand Trunk Ry. (*See Grand Trunk.*
Chicago & Great Southern Ry.
4-8½ g. 124 m. 4 lo. 122 c.
Geo. C. Kimball, *Rec*..........Attica, Ind.
H. Crawford, Jr., *Supt*..........Chicago, Ill.
Chicago & Iowa R. R. 4-8½ g. 104 m. 18 lo. 237 cars.
T. J. Potter, *Gen. Man*..........Chicago, Ill.
H. D. Judson, *Act. Gen. Supt*.....Rochelle, Ill.
H. S. Bryan, *M. M*..........Aurora, Ill.
Chicago & Northwestern Ry.
4-8½ g. 3,843 m. 672 lo. 21,054 cars.
Marvin Hughitt, *2d V. Prs. & G. M*. Chicago, Ill
C. C. Wheeler, *Gen. Supt*..........Chicago, Il
R. H. McCullough, *Ass't Gen. Supt*. Chicago, Ill.
R. W. Hamer, *Pur. Agt*..........Chicago, Ill.
Geo. W. Tilton, *Supt. M. P. & M.*; and
W. A. Scott, *A. Supt. M. P. & M*...Chicago, Ill
Wis. Div.: Ed. J. Cuyler, *Supt*......Chicago, Ill.
Gal. Div.: Chas. Murray, *Supt*..........Chicago, Ill.
Pen'a Div.: W. F. Fitch, *Supt*.....Escanaba, Mich.
J. Symons, *M. M*..........Escanaba, Mich.
Mad. Div.: C. A. Swineford, *Supt*..Baraboo, Wis.
H. D. Page, *M. M*..........Baraboo, Wis.
Minn. & Dak. Divs.: S. Sanborn, *Asst. Gen. Supt*.
Wis., St. P. & Dak. Div.:
Wm. Smith, *M. M*..........Winona, Minn.
Dak. Cen. Ry.: J. S. Oliver, *Supt*....Huron, Dak.
Ia. Div.: H. G. Burt, *Supt*..........Boone, Ia.
Robt. Quayle, *Act. M. M*..........Clinton, Ia.
No. Ia. Div.: M. Hopkins, *Supt*...Eagle Grove, Ia.
Win. & St. P. Div.:
W. P. Cosgrave, *Supt*..........Winona, Minn.
Wm. Smith, *M. M*..........Winona, Minn.
Chicago & West Michigan:
4-8½ g. 409 m. 47 lo. 1,629 cars.
J. B. Mulliken, *V. P. & G. Man*. Muskegon, Mich.
J. K. V. Agnew, *Gen. Supt*. Grand Rapids, Mich.
Allen Bourne, *Pur. Agt*..........Detroit, Mich.
W. F. N. Davis, *M. M*..........Muskegon, Mich.
Chicago & West'n Ind. R. R. 4-8½ g. 50 m. 12 lo. 150 c.
James D. Carson, *Gen. Man*..........Chicago, Ill.
R. W. Johnson, *M. M*..........Chicago, Ill.
Cincinnati, Columbus & Hocking Val. Ry.
4-9 g. 25 m. 2 lo. 77 cars.
D. P. Hyatt, *Gen Man*..........Dayton, O.
Cin., Georgetown & Portsmouth. 3 g. 35 m. 3 lo. 45 c.
M. Simmons, *Supt*..........Cincinnati, O
F. Enler, *M. M*..........Cincinnati, O.
Cincinnati & Green River Ry. 5 g. 17 m. 2 lo. 50 c.
G. B. Harper, *Supt*..........Yosemite, Ky.
F. S. Biggs, *M. M*..........Yosemite, Ky
Cin., Hamilton & Dayton R. R. 4-9 g. 352 m. 92 l. 2,932 c.
W. F. Stark, *Asst. Supt*..........Cincinnati, O.
John Black, *Gen. M. M*..........Lima, O
W. H. H. Allison, *M. C. B*..........Cincinnati, O
Cincinnati, Hamilton & Indianapolis R. R.
4-8½ g. 98 m.
C. J. Hepburn, *Supt*..........Cincinnati, O
Day. & Mich. Div.:

BENJAMIN ATHA, Treasurer. **RICHARD VOSE, President.** **D. P. CLARK Supt.**

We make our own Steel for Car Springs.



Spring Manufactory and Steel Works, Newark, N. J.

The Largest Crucible Cast-Steel Works in the Eastern States.

NATIONAL CAR SPRING COMPANY,

MANUFACTURERS OF

Elliptic, Volute-Spiral Hebbard, Oval, Round Bar, Rectangular-Passenger & Freight Car Springs

OFFICE, 13 BARCLAY STREET, NEW YORK.

THE HALE & KILBURN MFG. COMPANY,

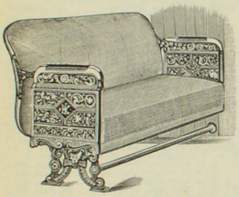
EXTENSIVE MANUFACTURERS OF

PATENTED

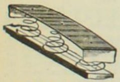
CAR SEATS

IN PLUSH AND RATTAN,

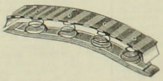
SEAT SPRINGS, Latest Improved, and other car work specialties. The greatest variety, best quality and handsomest designs.



Rattan Spring-Edge Seat.

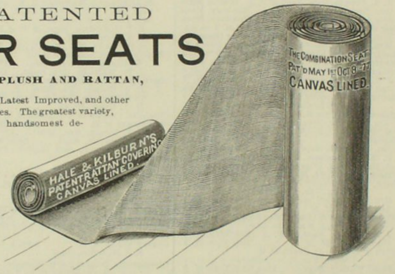


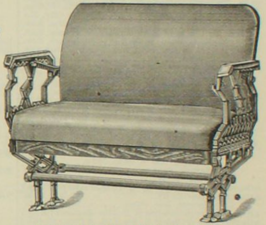
Section for Spring Seat.



Section for Spring Seat.

Illustrated and Descriptive Catalogue Mailed Promptly on Application. Estimates solicited and reasonable prices given. All work guaranteed.


HALE & KILBURN'S PATENT RATTAN COVERING CANVAS LINED.
THE COMBINATION SEAT PAT'D MAY 1st OCT 9 -77 CANVAS LINED.



Plush "Sectional" Spring Seat.

SPECIAL NOTICE.

We are the sole makers and owners of the Letters Patent of the celebrated

ELLIPTIC STEEL SPRINGS,

and other car work lately manufactured by Z. COBB & CO., Chicago, Ill.

NOS. 48 AND 50 NORTH SIXTH STREET, PHILADELPHIA, PA.

Asahel Wheeler's MARINE VARNISH,

For Outside Paint on Houses;
For Railroad Cars;
For Ship Painting.

This is, beyond a doubt, the most important auxiliary in Outside Painting which has ever been discovered. And in making this positive statement I speak thus after more than forty years' practical experience and special study *how to improve the durability of Paints used on structures which are exposed to the weather.*

After many experimental trials I have succeeded in accomplishing much toward increasing the durability of colors, and lessening the extravagant waste which has long attended the present system of outside painting. And in order to prove beyond a doubt the great value of my discovery, I waited FIVE YEARS in order to test its utility. Before announcing it publicly, I selected my own House and Stable—which had been painted five years previous—had the paint washed clean, and then put on one coat of the Marine Varnish, which *gave it an excellent gloss and restored the old Paint to its original color, freshness and appearance of new paint.* So perfect is the resemblance that it is difficult to convince those who are ignorant of the fact, that it has not been repainted.

The great value of this Marine Varnish is in its economy to householders—costing less than *half* the price of repainting; and *its durability is much greater.*

The Managers of Railroads likewise know the importance of economy in all the respective departments, especially in the care and preservation of their Rolling Stock. For that the Marine Varnish is unequaled; it is applicable to all parts except the bodies of Railroad Coaches, upon which the elegance of finish demands a higher gloss than the Marine Varnish is capable of producing.

The advantages of employing this Varnish on the Rolling Gear and on Box Cars are that it will last until the Cars are worn out, completely protecting the Paint, Lettering, etc., to the last.

The name (Marine Varnish) suggests its adaptation to Vessels, Boats, and Houses on the sea-shore. Paint coated with it will remain fast.

Ship Painting is a class of work which needs improvement more than any other, for it is subjected to the severest trials. The Marine Varnish is just the thing needed; it will beautify and preserve the Paint beyond the possibility of anything else, and is less expensive. It is also the most durable Spar Finish.

Having carefully experimented during many years, I am prepared to assert that the Marine Varnish produced by me is the culminating point of perfection in chemistry in this direction

Price, $3 per Gallon, with Can included.

Inventor and Proprietor, **ASAHEL WHEELER**, Dealer in Paints and Painting Materials, **145 MILK STREET, BOSTON, MASS.**

THE LOCOMOTIVE CYLINDER OIL CO.,

MANUFACTURERS OF

Railroad Valve Oil.

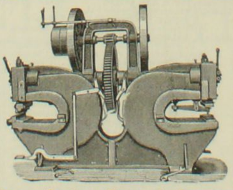
LOCOMOTIVE CYLINDER OIL CO
TRADE MARK
D.A.S.&Co
CHICAGO

Contracts made for specified quantities, deliverable, as required, at any depot in the United States or Canada.

Samples for trial, etc., will be cheerfully furnished on application to

D. A. STUART & CO.,

Agents Wanted. Chicago, Ill.



Power Punches, Shears & Hammers.

We make over 100 sizes of Punches and Shears Double and Single, varying from 500 to 36,000 pounds in weight, and adapted for every variety of work. The Double machines are equal to two Single ones, as each side is worked independently. Also

ADJUSTABLE HELVE
CUSHIONED HAMMERS

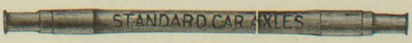
Of all sizes, Unequaled for Efficiency and Durability

THE LONG & ALLSTATTER CO.
Hamilton O.

GEO E. SACKETT, Pres. J. T. WRIGHT, Supt

New Albany Steam Forge,

MANUFACTURERS OF



AND

LOCOMOTIVE AXLES

Crank Pins, Equalizers, Slide-Bars, Connecting, Parallel and Piston Rods. Heavy Forgings of all Kinds of Iron and Steel.
Office and Works, New Albany, Ind.

CLEVELAND TWIST DRILL CO. 24-26 WEST ST. CLEVELAND, O.
101 CHAMBERS ST. NEW YORK.

Cincinnati, Indianapolis, St. Louis & Chicago Ry.
4-8½ g. 384 m 71 lo. 3,279 cars.
J. W. Sherwood, *Supt*. ....Indianapolis, Ind.
Geo. Tozzer, *Pur. Agt*...... .....Cincinnati, O.
J. S. Patterson, *M. of Mach. & M. C. B.* Cincinn., O
Cincinnati, New Orleans & Texas Pacific Ry. Co.
5 g. 846 m. 123 lo. 3,464 cars.
John C. Gault, *Gen. Man*........Cincinnati, O
Richard Carroll, *Gen. Supt*.......Cincinnati, O.
R. W. Healey, *Gen. Pur. Agt*.....Cincinnati, O.
James Meehan, *S. M. P. & M*... Cincinnati, O
Cin. So. Div.: W. W. Wells, *Supt*..Somerset, Ky.
J. L. Tomlinson, *Asst. S. M. P*.. Ludlow, Ky
John Richardson, *M. C. B*.... .Cincinnati, O.
A. Thomson, *M. M*.., ...Chattanooga, Tenn
Ala. Gr. S'n Div.: D. McLaren, *Supt*., and
George Manuell, *M. M*....Chattanooga, Tenn
J. M. Kelly, *M. C. B*.....Chattanooga, Tenn.
V. & M. Div.: E. F. Raworth, *Supt*., and
M. M.....Vicksburg, Miss.
V.S. & P. Div.: M. S. Belknap, *Supt*. Monroe, La.
W. Bell Smith, *M. M. & C. B*.....Monroe, La.
New Orleans & North-Eastern R. R.
Edmund L. Tyler, *Supt*.....New Orleans, La.
I. W. Fowle, *M. M* ....Meridan, Miss.
Cincinnati, Lebanon & Northern Ry.
Geo. L. Barringer, *Gen. Man*....Cincinnati, O.
H. I. Miller, *Supt* ....Cincinnati, O.
Cincinnati, Richmond & Chicago R. R. 4-9 g. 37 m.
C. J. Hepburn, *Supt*..............Cincinnati, O.
Cincinnati, Selma & Mobile R.R. 5 g. 71 m. 6 lo. 148 c.
A. McCollister, *Supt*................Selma, Ala.
H. L. Wright, *Pur. Agt*............Selma, Ala.
J. M. Levis, *M. M* ... .Marion, Ala.
Cincinnati, Van Wert & Michigan R. R.
4-9 g. 94 m. 8 lo. 168 cars.
J. M. C. Marble, *Gen. Man*......Van Wert, O.
H. H. Garr, *Supt. M. & E*.. ......Van Wert, O.
Cin., Wabash & Mich. Ry. 4-8½ g. 165 m. 13 lo. 402 c.
Norman Beckley, *Gen. Man. & P. A.* Elkhart, Ind.
O. W. Lamport, *Supt* ....Wabash, Ind.
S. B Tinker, *M. M. & M. C. B* ...Wabash, Ind
Cin., Wash. & Balt. 4-8½ g. 312 m. 65 lo. 1,889 cars
Jas. H. Stewart, *Gen. Man*.......Cincinnati, O.
Edw. Evans, *M. M* ....Chillicothe, O.
T. G. Duncan, *Supt. Car Dept*.......Zaleski, O.
Cincinnati, Wheeling & New York R.R. 4-8½ g. 13 m.
T. M. Atkinson, *Gen. Man*.........Batesville, O.
Cincinnati & Eastern Ry. 3 g. 68 m. 6 lo. 133 cars.
4-8½ g. 50 m. 3 lo.
S. Woodward, *Rec* .... .Cincinnati, O.
G. H. Wilber, *Gen. Sup. & Pur. Agt*. Cincinnati, O.
J. C. Homer, *M. M*.. ....Newtown, O.
P. W. Naughton, *M. M*. ....Batavia, O.
Cincinnati & South-Eastern Ry. 4-8½ g. 18 m.
John V. Patton, *Gen. Man*.... .Newport, Ky.
Clarksburg, Weston & Glenville R. R.
3 g. 26 m. 3 lo. 45 cars.
A. H. Kunst, *Pres. & Gen. Man*. Weston, W. Va.
Sam. A. Steel, *M. M*............Weston, W. Va.
F. Dillie, *M. C. B*........ .. ..Nottingham, O.
Cleveland, Columbus, Cincinnati & Indianapolis & St Louis Rys. and Dayton & Union R. R.
4-8½ g. 785 m. 246 lo. 7,988 cars.
G. M. Beach, *Asst. Gen. Man*....Cleveland, O.
J. L. Yale, *Pur. Agt*.......... ....Cleveland, O.
W. F. Turreff, *Gen. M. M*.........Cleveland, O.
Col. & Cin. Div.: Robt. Blee, *Supt* .Cleveland, O.
E. Hudson, *M. M*.... ....Cleveland, O.
A. G. Steinbrenner, *G. For. Car Dept*. do.
Ind'p'lis Div.: John O. Ewan, *Supt*..Ind'polis, Ind
Wm. Garstang, *M. M*. ...Brightwood, Ind.
N. Mark, *G. For. Car Dept*. Brightwood, Ind.
Ind. & St L Ry.: Tho. Burrows, *Supt*. St. Louis, Mo.
Wm. Garstang, *M. M. & C. B*. Brightwood, Ind.
Day. & Un. Rd.: J. H. Barrett, *Supt*...Dayton, O.
H. S. Gordon, *For. M. Shops* ......Dayton, O.
Clevel'd, Delphos & St. Louis R.R. 3 g. 56 m. 3 lo. 39 c.
I. H. Burgoon, *Gen. Man*..........Delphos, O.
B. F. Marshall, *M. M*..............Delphos, O.
Cleveland, Indiana & St. Louis R. R.
4-8½ g. 19 m. 2 lo. 20 cars.
J. A. Larned, *Rec. & Supt*......Anderson, Ind.
Cleveland, Mt. Vernon & Delaware R. R.
4-9 g. 144 m. 24 lo. 886 c.
N. Monsarrat, *Gen Supt*..............Akron, O.
G. M. Taylor, *M. M. & C. B*.....Mt. Vernon, O.
Cleve., Youngstown & Pitts. R. R. 3 g. 30 m. 3 lo. 138 c.
D. T. Lumley, *Gen. Supt*.. ....Alliance, O.
C. H. Dorman, *M. M. & M. C. B*....Alliance, O.
Cleveland, Lorain & Wheeling Ry.
4-8½ g. 158 m. 31 lo. 1,878 cars.
Oscar Townsend, *Gen. Man* ......Cleveland, O.
Wm. Thornburg, *Supt*......... . .. Lorain, O.
C. H. Waburton, *M. M*..... ....Lorain, O.
A. Warburton, *Gen. For*............Lorain, O.
Cleveland & Canton R. R.
3 g. 160 m. 26 lo. 1,036 cars.
Samuel Briggs, *Gen. Man*..... ..Cleveland, O.
John Bean, *M. M*.... .... .Canton, O.
Cleve. & Marietta R. R. (*See Wheel. & Lake Erie.*)
Cleveland & Pittsburgh. (*See Penna. Co.; (4) Div.*)
Clifton & Port Hudson R. R. 4-8½ g. 22 m. 3 lo. 12 c.
John Bradley, *Supt*......... .New Orleans, La.
W. F. Lockwood, *M. M*........... ..Clinton, La.
E. D. Anderson, *M. M*......... Vicksburg, Miss.
Clove Branch R. R. 4-8½ g. 8 m. 1 lo. 61 cars.
C. L. Kimball, *Supt* ..... .Matteawan, N. Y.
W. G. Vanbuskirk, *M. M*...Dutchess Jc., N. Y.
Coburg, Peterborough & Marmora Ry.
5-6 g. 47 m. 5 lo. 255 cars.
Jas. R. Barber, *Gen. Supt*... ....Cobourg, Ont.
Jas. Clark, *M. M*... .... Cobourg, Ont
John Tinney, *M. C. B*...........Cobourg, Ont.
Colorado Central R. R. (*See Un. Pac.; (4) Div.*)
Columbia & Greenville R. R. (*See Rich. & D.; (3) Div.*)
Columbia & Puget Sound R.R. 3 g. 21 m. 7 lo. 114 c.
J. L. Howard, *Gen. Supt*.. San Francisco, Cal.
Columbus, Hocking Valley & Toledo Ry.
4-9 g. 324 m. 90 lo. 7,353 cars.
G. R. Carr, *Gen. Supt*.............Columbus, O
W M. Greene, *Pur. Agt*..........Columbus, O.
Ira G. Hutchins, *M. M*.... .. ....Columbus, O.
J. M. Rockafield, *M. C. B*....... .Columbus, O.
Tol. Div.: M. T. Seymour, *Supt*......Columbus, O.
Hock. V. Div.: M. P. L. Booth, *Supt*. Columbus, O.
Ohio Riv. Div.: C. D. Norris, *Supt*.......Logan, O.
Columbus & Eastern R. R. in progress
J. E. Redfield, *Pres*....... ...Columbus, Ohio.
Columbus & Maysville Ry. (*See Cin. & East.*)
Columbus & Rome R. R. 3 g. 33 m. 3 lo. 30 cars.
M. E. Gray, *Supt* ... . .Columbus, Ga.
Columbus & Western Ry. 5 g. 89 m. 6 lo. 53 cars
E. A. Flewellen, *Gen. Man*. ...Columbus, Ga.
R. A. Bridges, *M. M* ....Opelika, Ala.
Concord R. R. 4-8½ g. 141 m. 41 lo. 1,264 cars
H. E. Chamberlin, *Supt. & P. Agt*. Concord, N. H.
J. T. Gordon, *M. M. & C. B*.. .Concord, N. H
Concord & Claremont R. R. (*See Northern of N. H.*
Conn. Riv. and Ver. Val. R. Rs. 4-8½ g. 130 m. 42 lo. 554 c.
J. Mulligan, *Supt. & Pur. Agt*. Springfield, Mass.
W. H. Stearns, *M. M. & M. C. B*. Springfield, Mass.
Conn. & Passumpsic Rivers R. R. (*See Passumpsic*)
Cooperstown & Susquehanna Valley R. R.
4-8½ g. 16 m. 2 lo. 14 cars.
Andrew Shaw, *Pres* ....Cooperstown, N. Y.
A. Mumford, *M. M*.........Cooperstown, N. Y.
Corning, Cowanesque & Antrim Ry.
(*See F. Br. Coal Co.*)
Cornwall R. R., 4-8½ g. 12 m. 5 lo. 166 cars
J. M. Havard, *G. Supt. & M. M*....Lebanon, Pa.
Levi Bloneh, *M. C. B* ....Lebanon, Pa.
Cornwall & Lebanon R. R. 4-9 g. 5 m.
J. C. Jennings, *Supt* ....Lebanon, Pa.
Coudersport & Port Allegheny R. R.
3 g. 17 m. 2 lo. 64 cars.
B. A. McClure, *Gen. Supt*.....Coudersport, Pa.
Credit Valley Ry. 4-8½ g. 184 m. 22 lo. 535 cars.
Wm. Whyte, *Gen. Supt*..... .....Toronto, Ont.
John Macnab, *Pur. Agt*..... .....Toronto, Can.
D. Preston, *Mech. Supt*....... ...Toronto, Can.
Crescent Springs Ry. 3 g. 12 m. 2 lo. 50 c.
David Joyce, *Gen. Man*........ ...Lyons, Ga.
W. R. Bourm, *Asst. Gen. Man*. Shell Lake, Wis.
John Devereaux, *Gen. Supt*...Shell Lake, Wis.
C. L. Wickersham, *Pur. Agt*.......Chicago, Ill
Ira Wood, *Supt. M. P. & M*...Shell Lake, Wis.
John Blackburn, *M. C. B* .....Shell Lake, Wis.
Crooked Creek R. R. 3 g. 9 m. 1 lo. 37 cars.
Walter C. Willson, *Gen. Man*. Webster City, Ia.

Geo. W. Post, *Pur. Agt*..............Lehigh, Ia.
Crown Point Iron Co.'s R. R. 3 g. 13 m. 3 lo. 135 c.
A. L. Inman, *Gen. Man*..... .Plattsburg, N. Y.
H. L. Reed, *Pur. Agt*.......Crown Point, N. Y.
Jas. McMann, *Supt*..........Crown Point, N. Y.
C. W. Sanders, *M. M*.... .. Crown Point, N. Y.
Cumberland Ry. 4-8½ g. 32 m. 1 lo. 64 c.
J. A. Killam, *Gen. Man*.........Parsboro, N. S.
K. McKinnon, *M. M*............Parsboro, N. S.
Cumberland Valley R. R. 4-9 g. 127 m. 25 lo. 474 cars.
J. F. Boyd, *Supt*...... .....Chambersburg, Pa.
A. S. Hull, *M. M*.......... ..Chambersburg, Pa.
C. Wicke, *M. C. B*...... ...Chambersburg, Pa.
Cumberland & Maurice River R. R. 4-8½ g. 20 m.
L. H. Dowdney, *Supt*........Port Norris, N. J.
Cumberland & Penn. R. R. 4-8½ g. 55 m. 28 lo. 625 c.
P. L. Burwell, *Gen Supt & P A*. Cumberland, Md.
N. W. Howson, *Mast. of Mach*. Mt. Savage, Md.
Nathan Binix, *M. C. B*.........Mt. Savage, Md.

D

Danville & New River R. R. 3 g. 43 m. 2 lo. 30 c.
W. T. Sutherlin, *Gen. Man*.......Danville, Va.
W. T. Whittaker, *M. M*...........Danville, Va.
Danbury & Norwalk R. R. 4-8½ g. 36 m. 7 lo. 112 c.
C. M. Crawford, *G. Supt. & P. A*. S. Norwalk, Ct.
W. H. Wilkinson, *M. M. & C. B*. Danbury, Conn.
Danville, Mocksville & So.-Wn. R. R. 3 g. 28 m.
H. M. Shivler, *Supt*...........Leakesville, N. C.
Danville, Olney & O. R. R.R. 4-8½ g. 78 m. 3 lo. 34 c.
C. E. Henderson, *Rec. & Man*........Olney, Ill.
W. A. Bell, *M. M & C. B*.. .... ..Kansas, Ill
Dayton & Toledo R. R. 3 g. 96 m.
C. E. Henderson, *Gen. Man*...... ..Dayton, O.
J. E. Gimperling, *Supt*..............Dayton, O.
Dayton & Union R. R. (*See Clev., Col., Cin. & Ind.*)
Dayton & Michigan R. R. (*See Cin., Ham. & Day.*)
Dayton & Ironton R. R.
C. E. Henderson, *Gen. Man*. Indianapolis, Ind.
H. C. Norton, *Pur. Agt*... .Indianapolis, Ind.
E. Heisrodt, *Supt. Mach*..... ....Dayton, O.
Del. Lackawanna & W. and N. Y., Lack. & W. R. Rs.
4-8½ g. 930 m. 436 lo. 31,989 cars.
Wm. F. Halstead, *Gen. Supt*.. ...Scranton, Pa.
G. W. B. Cushing, *Pur. Agt*...New York, N. Y.
Walter Dawson, *Mast. of Mach*...Scranton, Pa.
Robt. McKenna *M. C. B* ....Scranton, Pa.
Bloomsb'g Div.: C. Graham, *M. M*..Kingston, Pa.
Utica Div.: A. C. Salisbury, *Supt*....Utica, N. Y.
Thos. Thatcher, *M. M*.......... ....Utica, N. Y.
Morris & Essex Div.; Sussex; P. & D. and C. R. Rs.
A. Reasoner, *Supt*.... ....Hoboken, N. J.
W. H. Lewis, *M. M*......... Kingsland, N. J.
J. W. Baker, *Mast. Car Rep*. ....Dover, N. J
Oswego & Syracuse Div.:
W. K. Niver, *Supt*..............Oswego, N. Y.
Jas. Buchanan, *M. M*. .. ...Syracuse, N. Y.
Syracuse, Binghamton & New York R. R.
4-8½ g. 81 m. 20 lo. 598 cars.
W. K. Niver, *Gen. Supt*... ...Syracuse, N. Y.
Jas. Buchanan, *M. M*........Syracuse, N. Y.
Cayuga Div.: *Supt* Ithaca, N.Y.
Buffalo Div.: T. B. Griffith, *M. M*..Buffalo, N. Y.
Delaware, Maryland & Virginia R. R.
4-8½ g. 101 m. 7 lo. 145 cars.
Tho. Groom, *Supt*.... ....Lewes, Del.
Geo. Messick, *M. M*.................Lewes, Del.
W. H. Virden, *M. C. B*.............Lewes, Del.
Delaware River R. R. 4-8½ g. 20 m. 3 lo. 8 cars.
E. H. Green, *Supt*.........Pedricktown, N. J.
Delaware & Hudson Canal Co.
4-3 and 4-8½ g. 634 m. 180 lo. 10,799 cars.
C. F. Young, *Pres. & Gen. Man*. Honesdale, Pa.
H. G. Young, *Asst. Gen. Man*....Honesdale, Pa.
J. White Sprong, *Pur. Agt*.......Albany, N. Y.
R. C. Blackall, *Supt. of Mach*.... .Albany, N. Y.
Susq. Div.: C. D. Hammond, *Supt*. Albany, N. Y.
Tho. Howard, *M. M*............Oneonta, N. Y.
J. R. Skinner, *M. C. B*. ....Oneonta, N. Y.
Sar. & Ch. Divs.: T. Voorhees, *Supt*...Troy, N. Y.
J. L. Corey, *M. M*... .... . Green Island, N. Y.
Chr. Körner, *M. C. B*.. .. Green Island, N. Y.
Pa. Div.: R. Manville, *Supt. & Pur. Agt*. and
S. H. Dotterer, *M. M*.... ....Carbondale, Pa.
T. Orchard, *M. C. B*........ Carbondale, Pa.
Denver Circle R. R. 3 g. 12 m. 7 lo. 15 cars
Theo. C. Henry, *Gen. Man*.........Denver, Col.
W. B. Sprague, *Gen. Supt*.........Denver, Col.
Denver, Utah & Pacific R. R. 3 g. 34 m. 4 lo. 171 c.
L. M. Fouts, *Supt*..... ....Denver, Col.
Denver & New Orleans. 4-8½ g. 140 m. 11 lo. 400 c.
C. W. Fisher, *Gen. Man*............Denver, Col.
Chas. Wheeler, *Pur. Agt*... .....Denver, Col.
J. H. Kirk, *M. M. & M. C. B*.. ..Denver, Col.
Denver & Rio Grande Ry. 3 g. 1,317 m. 222 lo. 5,932 c.
W. S. Jackson, *Rec*.................Denver, Col.
C. M. Hobbs, *Pur. Agt* ... .Denver, Col.
N. W. Sample, *Supt. M. P. & M* ...Denver, Col.
(1) Col. & N. M. Div.: R. E. Ricker, *G. S.* Denver, Col
1st Div.: W. W. Borst, *Supt*.......S. Pueblo, Col.
2d Div.: Cole Lydon, *Supt*..... ...Alamosa, Col.
3d Div.: G. W. Cook, *Supt*........Leadville, Col
4th Div.: R. M. Ridgway, *Supt*.......Salida, Col.
Denver, Rio Grande & Western Ry. 3 g. 369 m
W. H. Bancroft, *Rec. & Gen. Supt*.,
Salt Lake City, Utah.
A. L. Horner, *Ass't Supt* Salt Lake City, Utah.
S. C. Smith, *M. M*.... ...Salt Lake City, Utah.
Des Moines, Osceola & Southern R. R.
3 g. 100 m. 7 lo. 253 cars
Jas. Donahue, *Supt*............Des Moines, Ia.
Wm. Persing, *M. M*... ....Osceola, Ia.
Elias Tonet, *M. C. B*...............Osceola, Ia.
Des Moines & Ft. Dodge. 4-8½ g. 144 m. 13 lo. 350 c.
C. N. Gilmore, *Supt*............Des Moines, Ia.
John McGrayel, *M. M*......Grand Junction, Ia.
E. A. Avery, *M. C. B* ....Grand Junction, Ia.
Det., Bay City & Alpena R. R. 3-2 g. 48 m. 5 lo. 227 c.
Milo Eastman, *Supt* ... ... East Tawas, Mich.
Det., Lansing & No'n R. R. 4-8½ g. 222 m. 84 lo. 1027 c
John B. Mulliken, *Gen. Man*......Detroit, Mich.
Allan Bourn, *Pur. Agt*............Detroit, Mich.
Thos. M. Fish, *Gen. Supt*...........Ionia, Mich.
G. C. Watrous, *M. M. & C. B* ......Ionia, Mich.
Det., Mack. & Marq. R.R. 4-8½ g. 152 m. 16 lo. 1,112 c.
Andrew Watson, *Gen. Supt*...Marquette, Mich.
W. J. Tench, *Pur. Agt*........Marquette, Mich.
John B. Wilson, *Mech. Supt*....Marquette, Mich.
Dorchester & Delaware R.R. (*See Penna. (4) Del. Div.*)
Dubuque & Dakota R. R. 4-8½ g. 64 m. 2 lo. 54 cars.
A. C. Goodrich, *Supt*.............Hampton, Ia.
W. S. Couch, *Pur. Agt*........ .Dubuque, Ia.
Duck River Valley R. R. (*See Nash., Chat. & St. L.*)
Dunkirk, Allegheny Valley & Pittsburgh R. R.
4-8½ g. 91 m. 14 lo. 102 cars.
D. Thayer, *Gen. Supt*............Dunkirk, N. Y.
R. C. Moore, *Pur. Agt*...... .New York, N. Y.
J. C. Haggett *M. M. & C. B*.....Dunkirk, N. Y.

E

East Alabama Ry. 5 g. 22 m. 3 lo. 19 cars.
W. W. Barnes, *Supt*..............Opelika, Ala.
East Broad Top R. R. 3 g. 30 m. 7 lo. 260 cars.
A. W. Sims, *Supt* ....Orbisonia, Pa.
A. W. Greenwood, *M. M*.... ....Orbisonia, Pa.
East St Louis & Carondelet Ry. 4-9 g. 4 lo. 27 c.
Joseph Hill, *Gen. Supt*......East St. Louis, Ill.
East Tenn. & Western North Car. R. R.
3 g. 34 m 3 lo. 73 cars.
Thomas E. Matson, *Supt*..Elizabethton, Tenn.
East Tennessee, Virginia & Georgia R. R.
5 g. 1,453 m. 166 lo. 3,670 cars.
Henry Fink, *Rec*..............Knoxville, Tenn
C. H. Hudson, *Gen. Man*......Knoxville, Tenn.
J. E. Wilcox, *Pur. Agt*. ......Knoxville, Tenn.
East Tenn. Div. and No. Car. and Ohio Branches.
F. K. Huger, *Supt*...........Knoxville, Tenn.
B. J. Sitton, *M. M*..... . ....Knoxville, Tenn.
Jos. Armbruster, *M. C. B*....Knoxville, Tenn.
Alabama Div.: J. M. Bridges, *Supt*...Selma, Ala.
Simon Gay, *M. M*. .. .. Selma, Ala.
W. W. Pierce, *M. C. B*. ....Selma, Ala.
Memphis & Charleston R. R. (Div.):
R. B. Pegram, Jr., *Supt*..... Memphis, Tenn
H. N. Burford, *M. M*... ....Memphis, Tenn.
Georgia Div.: J. W. Fry, *Supt*......Atlanta, Ga.
J. E. Mallory, *Ass't Supt*..... ....Macon, Ga.
W. A. Walden, *M. M*........ ....Atlanta, Ga.
J. H. Perkins, *M. C. B*. ....Atlanta, Ga.

East & West R. R. of Ala. 3 g. 110 m. 9 lo. 85 c.
T. J. Nicholl, *Manager*.........Cedartown, Ga.
C. F. West, *M. M. & C. B*... Cedartown, Ga
Eastern R. R. 4-8½ g. 283 m. 110 lo. 2,268 cars.
Payson Tucker, *Gen. Man*.........Boston, Mass.
D. W. Sanborn, *Mast. of Trans*..Boston, Mass.
G. F. Hurd, *Pur. Agt*....... . ..Boston, Mass.
Amos Pilsbury, *S. M. P. & M*. ..E. Boston, Mass.
A. M. Waitt, *G. For. Car Dept*.....Salem, Mass.
Con'y Div.: J. W. Sanborn, *Supt*., Wolfboro J., N.H.
Eastern Kentucky R. R. 4-8½ g. 34 m. 5 lo. 160 c.
H. W. Bates, *Man. & Pur. Agt*... Riverton, Ky.
H. W. Crawford, *M. M*.........Hunnewell, Ky.
Eastern (Maine) R. R. (*See Maine Central.*)
Eastern Shore R. R. 4-8½ g. 38 m. 3 lo. 9 c.
W. Thompson, *Supt*........Princess Anne, Md.
F. Strattner, *M. M*......... Princess Anne, Md.
Elmira, Cortland & Northern R. R. 4-8½ g
A. A. McLeod, *Gen. Man*.........Elmira, N. Y.
Edw. Mahler, *Pur. Agt*...........Elmira, N.Y.
Thos Kearsley, *M. M. & M. C. B*. Cortland, N.Y.
Erie & Huron Ry. 4-8½ g. 40 m.
E. O. Bickford, *Gen Man*.........Toronto, Ont.
Erie & Pittsburg R. R. (*See Penna. Co.; (3) Div.*)
Etowah & Deaton's R. R. 3 g. 9 m.
D. M. Rogers, *Gen. Man*...........Etowah, Ga.
Eureka Springs Ry. 4-8½ g. 19 m. 1 lo. 9 cars.
Powell Clayton, *Gen. Man*. Eureka Springs, Ark.
Eureka & Palisade R. R. 3 g. 97 m. 7 lo. 125 cars.
B. Gilman, *Gen. Supt & Pur. Agt*.. Eureka, Nev.
J. M. Crawford, *M. M*............Palisade, Nev.
A. S. Longley, *M. C. B*....... ...Palisade, Nev.
European & North American R. R. (*See Maine Cen.*)
Evansville, Rockport & E'n Ry. 4-9 g. 71 m. 5 lo. 98 c
H. L. Shepard, *Supt*...........Evansville, Ind.
Evansv. & Terre Haute. 4-8½ g. 169 m. 26 lo. 973 c.
D. J. Mackey, *Gen. Supt*...... Evansville, Ind.
John Torrance, *M. M*.... ......Evansville, Ind.

F

Fall Brook Coal Co. 4-8½ g. 250 m 60 lo. 2,006 c.
Pine Creek Ry.; Corning, Cowanesque & Antrim; Cowansque Br.: Syracuse, Geneva & Corning; Geneva & Lyons; and New York & Penn Yan.
A. H. Gorton, *Gen. Supt* ....Corning, N. Y.
G. R. Brown, *Asst. Supt*.........Corning, N. Y.
W. H. Chaphe, *Pur. Agt*... ....Corning, N. Y.
Wm. A. Foster, *Supt. R. S. & Mach*. Corning, N. Y
C. J. Butter, *M. C. B*.. ....Corning, N. Y.
Fitchburg R. R., 4-8½ g. 152 m. 100 lo. 3,566 cars.
John Adams, *Gen. Supt*...........Boston, Mass.
F. S. Pratt, *Pur. Agt* ....Boston, Mass.
Orlando Stewart, *Supt. M. P*......Boston, Mass.
J. W. Marden, *Supt. C. Dept*. Charlestown, Mass.
Flint & Pere Marq. 4-8½ g. 346 m. 78 lo. 2,664 cars
H. C. Potter, *Gen. Man*..... E. Saginaw, Mich.
D. Edwards, *Asst. Gen. Man*..E. Saginaw, Mich
G. G. Cook, *Pur. Agt*.........E. Saginaw, Mich.
Sanford Keeler, *Gen. Supt*..E. Saginaw, Mich.
W. F. Potter, *Supt*. (E. Div.)..E. Saginaw, Mich
W. F. Potter, *Supt*. (W. Div.)..E. Saginaw, Mich.
T. J. Hatswell, *M. M* ..... .E. Saginaw, Mich.
H. M. Perry, *M. C. B*..........E. Saginaw, Mich.
Florida Ry. & Nav. Co. 5 g. 488 m. 31 lo. 397 c.
D. E. Maxwell, *Gen. Supt*.... Fernandina, Fla.
R. V. Dohoney, *M. M. & C. B* Fernandina, Fla.
Florida Southern Ry. 3 g. 159 m. 17 lo. 155 cars.
Sherman Conant, *Gen. Man*.. ...Palatka, Fla.
Jas. D. Hollister, *Supt. & P. Agt*..Palatka, Fla.
St. J. & L. Eustis Div.: 50 m.
W. J. Jarvis, *Supt* ....Ft. Mason, Fla.
W. B. Denham, *Asst. Supt*...Ft. Mason, Fla.
W. M. Rutherford, *M. M*.....Ft. Mason, Fla.
Fonda, Johnst'n & Gloversv. 4-8½ g. 26 m. 5 lo. 35 c.
Lawton Caten, *Supt*.. ......Gloversville, N. Y.
G. V. Putman, *M. M*....... Gloversville, N. Y.
Fond du Lac, Amboy & Peoria. 3 g. 30 m. 2 lo. 35 c.
Alonzo Kinyon, *Supt. & P. A*. Fond du Lac, Wis.
Fort Dodge & Fort Ridley R. R. (*See Minn. & St. L.*)
Franklin & Prov. & Hopkinton. 22 m.
E. T. Logee, *Supt* ....Milford, Mass.
Ft. Madison & No.-West'n Ry. 3 g. 45 m. 4 lo. 121 c.
S. B. Kenrick, *Rec. & Pur. Agt*. Ft. Madison, Ia
I. L. Lamb, *M. M. & C. B*..... Ft. Madison, Ia.
Ft. Wayne, Cin. & Louisv. 4-8½ g. 128 m. 10 lo. 250 c.
White Water R. R 4-8½ g. 65 m. 5 lo. 170 cars.
W. W. Worthington, *Gen. Supt*...Ft. Wayne, Ind.
T. H. Haberkorn, *M. M*.........Ft. Wayne, Ind.
Wm. Knight, *M. C. B*...........Ft. Wayne, Ind.
Ft. Worth & Denver City Ry. 4-8½ g. 114 m. 8 lo. 443 c.
C. L. Frost, *Gen. Supt* ......Fort Worth, Tex.
Freehold & New York Ry. 4-8½ g. 15 m. 4 lo. 40 c.
J. E. Ralph, *Supt. & Pur. Agt*. Freehold, N. J.
M. C. Mooney, *M. M*.... .... Freehold, N. J.
C. H. Snedeker, *M. C. B*...... Freehold, N. J.
Fulton County N. G. Ry. 3 g. 61 m. 4 lo. 168 cars.
A. C. Atherton, *Gen. Supt. & P. Agt*. Lewiston, Ill.

G

Gainesville & Dahlonega R. R. 3 g. 15 m.
W. P. Price, *Pres*..............Dahlonega, Ga.
Gainesville, Jefferson & Southern R.R. (*See Cen. of Ga*)
Gal., Harrisburg & San Antonio Ry. (*See Cen. Pac.*)
Galveston, Houston & Hend. R.R. (*See Mo. Pac. (5) Div.*)
Galveston, Sabine & St. Louis Ry.
4-8½ g. 28 m. 2 lo. 33 cars
Brad. Barner, *Gen. Man*.... ..Longview, Tex.
Chas. H. Jewell, *Gen. Supt*.....Longview, Tex.
Geneva, Ithaca & Sayre R. R. (*See Lehigh Val.*)
George's Creek & Cumberland R. R.
4-9 g. 25 m. 6 lo. 212 cars.
J. A. Millholland, *Gen. Man*..Cumberland, Md.
Georgetown & Lane's R. R. 5 g. 36 m. 2 lo. 52 c.
G. W. Earle, *Gen. Supt*......Georgetown, S. C
Georgia R. R. 5 g. 307 m. 42 lo. 1,048 cars.
John W. Green, *Gen. Man*.........Augusta, Ga.
John S. Cook, *M. M*............... Augusta, Ga.
T. M. Preval, *M. C. B*... ....Augusta, Ga.
Georgia Pacific Ry. 5 g. 218 m.
I. Y. Sage, *Gen. Supt*........Birmingham, Ala.
S. H. Purcell, *Div. Supt*.......Greenville, Miss.
G. H. Barnum, *Div. Supt*... ..Columbus, Miss.
Gettysburg & Harrisburg R. R. 4-9 g. 21 m.
W. H. Woodward, *Supt*. Pine Grove Furnace, Pa.
G'd Rap., Newaygo & L. S. R. R. (*See Chic. & W. M.*)
Grand Rapids & Indiana. 4-9 g. 528 m. 56 lo. 2,083 c.
W. O. Hughart, *Gen. Man*. Grand Rapids, Mich.
W. R. Shelby, *Pur. Agt*....Grand Rapids, Mich.
S. D. Bradley, *M. M*...... Grand Rapids, Mich.
No'n Div.: J. M. Metheany, *Supt*. G'nd Rap., Mich.
So'n Div.: P. S. O'Rourke, *Supt*. Fort Wayne, Ind.
Grand Southern Ry. of New Brunswick.
4-8½ g. 82 m. 5 lo. 54 cars.
J. N. Greene, *Gen. Man*..... .St. George, N. B.
F. W. Holt, *Supt*............. St. George, N. B.
Thomas Logan, *M. M*...... .St. George, N. B.
Grand Tower & Carbondale. 4-8½ g. 25 m. 6 lo. 357 c.
J. C. Simpson, *Supt*.'..........Carbondale, Ill.
Hugh Smith, *M. M*...... ....Murphysboro, Ill.
O. L. Garrison, *Pur. Agt* ...... St. Louis, Mo.
Grand Trunk Ry. 4-8½ g. 2,332 m. 660 lo. 16,330 c.
Joseph Hickson, *Gen. Man*.. ...Montreal, Can.
Wm. Wainright, *Asst. Gen. Man*. Montreal, Can.
Jno. Taylor, *Gen. Storekeeper*...Montreal, Can.
Herbert Wallis, *Mech. Supt*.....Montreal, Can.
Wm. McWood, *Supt. Car Dept*..Montreal, Can.
J. Harkom, *Ass. Mech. Supt*..Richmond, P. Q.
A. H. Smith, *Ass. Mech. Supt*....Toronto, Ont.
R. Boaz, *Asst. Mech. Supt* .. ..Stratford, Ont.
F. L. Wanklyn, *Loco. Works*...Montreal, Can.
Gt. West'n Div.: Chas. Stiff, *Supt*. Hamilton, Ont.
E. Baines, *Store Kpr*. ....London, Ont.
C. K. Domville, *Mech. Supt*...Hamilton, Ont.
E. Mavor, *Asst. Mch. Supt* .. Hamilton, Ont.
J. D. McIlwain, *Asst. Car Dept*. London, Ont.
Chi. & Gr. Trunk Ry. 4-8½ g. 330 m. 103 lo. 1,191 c.
W. J. Spicer, *Gen. Man*..... Detroit, Mich.
A. B. Atwater, *Supt*. ....Battle Creek, Mich.
J. F. Lorimer, *Storekeeper*.....Detroit, Mich.
H. Roberts, *Mech. Supt*........Detroit, Mich.
Midland of Can. 4-8½ g. 471 m. 44 lo. 1,423 c.
W. B. Ferguson, *Supt*.........Peterboro, Ont.
J. D. Barnet, *Mech. Supt*... Port Hope, Ont.
Det., Gr. H. & Mil. Ry. 4-8½ g. 189 m. 39 lo. 696 c.
W. J. Spicer, *Gen. Man*... ....Detroit, Mich.
John S. Lorimer, *Storekeeper*....Detroit, Mich.
W. J. Morgan, *Supt*..............Detroit, Mich.
H. Roberts, *Mech. Supt*......Port Huron, Mich.

Green Bay, Winona & St. Paul R. R.
4-8½ g. 250 m. 19 lo. 623 cars.
G. Campbell, *Gen. Man.. & P. A*. Green Bay, Wis.
A. Fenwick, *M. M*......... ... Ft. Howard, Wis.
Green Cove Spring & Melrose R.R. 3 g. 32 m. 1 lo. 11 c.
S. Ackley, *Pres*..... ....Philadelphia, Pa.
Greenwood, Laurens & Spart'g. 5 g. 4 lo.
J. N. Bass, *Supt* ....Augusta, Ga.
T. F. Warwick, *M. M. & M. C. B*..Augusta, Ga.
Greenwich & Johnsonville Ry. 4-8½ g. 15 m. 1 lo. 7 c.
J. H. Thompson, *Supt*.... ...Greenwich, N. Y.
Gulf, Col. & Santa Fé Ry. 4-8½ g. 536 m. 51 lo. 1,400 c.
Webster Snyder, *Gen. Man*..Galveston, Texas.
Jno. W. Thorne, *Pur. Agt*....Galveston, Texas.
W. H. Reilly, *M. M. & M. C. B*..Galveston, Texas.
H. J. Bearup, *Asst. M. M*......Galveston, Tex.
Gulf, W'n Texas & Pac. Ry. 4-8½ g. 68 m. 6 lo. 74 c.
M. D. Monserrate, *Supt. & Pur. Agt*. Cuero, Tex.
James Mooney *M. M*....... .. Cuero, Texas.

H

Hannibal & St. Jo. R. R. 4-8½ g. 292 m. 76 lo. 1,906 c.
J. F. Barnard, *Gen. Man* ..... .St. Joseph, Mo.
S. E. Cranco, *Gen. Supt* ... .Hannibal, Mo.
Wm. Irving, *Pur. Agt*... .... Chicago, Ill
N. J. Paradise, *Supt. M. M*.. ....Hannibal, Mo.
G. M. Shryock, *M. C. B*..........Hannibal, Mo.
Hanover Branch R. R. 4-8½ g. 8 m. 2 lo. 18 cars
E. Y. Perry, *Supt*........South Hanover, Mass
Hanover Junction, Hanover & Gettysburg R. R.
4-8½ g. 74 m. 10 lo. 140 cars.
H. D. Scott, *Gen. Supt*.........Gettysburg, Pa.
John J. Bingley *M. M*...........Hanover, Pa.
Jas. Harthorn, *M. C. B*....... ...Hanover, Pa.
Harrisburg & Potomac R. R. 4-8½ g. 41 m. 3 lo. 45 c.
R. H. Middleton, *Supt*......Boiling Springs, Pa.
Hartford & Conn. Val. R. R. 4-8½ g. 47 m. 9 lo. 196 c.
O. M. Shepard, *Supt*.... ..... New Haven, Ct.
John Henry, Jr., *Supt. M. P*. .Hartford, Conn.
Hartford & Conn. W'n R.R. 4-8½ g. 110 m. 16 lo. 495 c.
Edw. McNeil, *Supt*........ .... .Hartford, Ct.
Chas. H. Keane, *M. M* ....Hartford, Ct.
Hecla & Torch Lake R. R. 4-1 g. 5 m. 5 lo. 165 cars.
W. A. Childs, *Gen. Man*........Calumet, Mich.
Herkimer, Newport & Poland Ry.
3-6 g. 17 m. 2 lo. 24 cars.
Albert Wilber, *Supt*...........Herkimer, N. Y.
Hobart & Manistee River R. R. 3 g. 9 m. 2 lo. 42 c.
H. W. Marsh, *Supt*. ....Hobart, Mich.
Hot Springs R. R. 3 g. 25 m. 3 lo. 39 cars.
J. N. Conger, *Supt*... ....Hot Springs, Ark.
L. Finlay, *M. M*.................Malvern, Ark.
Housatonic R. R. 4-8½ g. 126 m. 23 lo. 879 cars.
W. H. Yeomans, *Supt*.. ....Bridgeport, Ct.
D. S. Draper, *Pur. Agt*..........Bridgeport, Ct.
N. Slingland, *M. M*..... ......Falls Village, Ct.
J. J. Ferris, *M. C. B*....... ...Falls Village, Ct.
Houston Belt Ry. 4-8½ and 3 gauge 16 miles.
S. L. Werden, *V. P. & Gen. Man*. Houston, Tex.
Houston, East & West Tex. Ry. 3 g. 150 m. 10 lo. 570 c.
Paul Bremond, *Pr. & Pur. Agt*..Houston, Tex.
E. L. Bremond, *Gen. Man*........Houston, Tex.
Ed. Campbell, *M. M*........... Houston, Tex.
C. F. Schelewa, *M. C. B*. ......Houston, Texas.
Houston & Tex. Cen. Ry. 4-8½ g. 750 m. 78 lo. 2,526 c.
Geo. A. Quinlan, *Gen. Supt*......Houston, Tex.
A. H. Swanson, *Gen. Tr. Man*.....Houston, Tex.
L. C. Noble, *Gen. M. M*...........Houston, Tex.
James McGee, *M. C. B*.. ....Houston, Tex.
So. & Wn. Divs.: M. G. Howe, *Supt*. Houston, Tex.
No. & Mi. Divs.: G. A. Quinlan, *Supt*., and
C. H. Burns, *Asst. M. M*..... .Corsicana, Tex.
No.-Wn. Div.: Donald Allen, *Supt*.... Waco, Tex.
Humeston & Shenandoah R. R.
4-8½ g. 113 m. 18 lo. 80 cars.
E. C. Murphy, *Gen. Man*...... ...Clarinda, Ia.
M. B. Snyder, *M. M*. ....Shenandoah, Ia.
Huntingdon & Br. Top Mt. 4-8½ g. 65 m. 18 lo. 318 c.
Geo. F. Gage, *Gen. Man*. .. .Huntingdon, Pa.
Samuel B. Knight, *Pur. Agt*..Philadelphia, Pa.
William Barkla *M. M*...... .....Saxton Pa.

I

Illinois Central R. R. 4-8½ g. 1,928 m. 334 lo. 8,565 c.
E. T. Jeffery, *Gen. Supt* .... .Chicago, Ill
O. Ott, *Pur. Agt*...... ....Chicago, Ill
Henry Schlacks, *Supt. of Mach*....Chicago, Ill.
W. B. Snow, *M. M. Car Works*.....Chicago, Ill
(1) Ill. & Ia. Divs.: C. A. Beck, *Supt*.....Chicago,
Chic. Div.: T. J. Hudson, *Supt* . ... Cairo, Ill.
Wm. Renshaw, *M. M* ....Chicago, Ill.
Mid. Div.: H. L. Frisbie, *Supt*.. .... .Pontiac, Ill.
Spring. Div.: W. Wilkinson, *Supt*. Springfield, Ill.
Wm. Griffin, *M. M*..... . .... .Clinton, Ill.
No'n Div.: J. C. Jacobs, *Supt*..........Amboy, Ill.
J. B. Edams, *M. M*.......... ...Amboy, Ill.
Ia. Div.: M. Gilleas, *Supt*........ ... Dubuque, Ia.
Thos. W. Place, *M. M*........ .Waterloo, Ia.
(2) So. Divs.: C. M. Sheafe, *Supt*....New Orleans, La.
La. Div.: J. M. Turner, *Supt*. McComb City, Miss.
W. B. McKenna, *M. M*.... McComb City, Miss.
Miss. Div.: J. G. Mann, *Supt*......Jackson, Tenn.
J. F. White, *M. M*........Water Valley, Miss.
Illinois Midland Ry. 4-8½ g. 176 m. 12 lo. 611 cars.
D. H. Conklin, *Rec. & Gen. Man*......Decatur, Ill.
O. E. Grady, *Train Mast*...........Decatur, Ill.
Frank Young, *For. Shops*..............Paris, Ill.
Illinois & St. Louis R. R. 4-8½ g. 19 m. 10 lo. 450 c
C. H. Sharman, *Gen. Supt. & P. A*. St. Louis, Mo
D. J. Timlin, *M. M*... ....Belleville, Ill.
Charles Rothe, *M. C. B*..... .. E. St. Louis Ill
Indiana, Bloomington & Western Ry.
4-8¾ g. 826 m. 108 lo. 4,018 cars.
C. E. Henderson, *Gen. Man*. Indianapolis, Ind.
I. H. Wilson, *Gen. Supt* .....Indianapolis, Ind.
H. C. Norton, *Pur. Agt*...... Indianapolis, Ind.
Jos. S. Porter, *Div. M. M*.........Sandusky, O.
E. Hiserodt, *Gen. M. M*.......Indianapolis, Ind.
M. Fogarty, *Div. M. M* ....Urbana, Ill.
W. B. Warren, *Div. M. M* ....Indianapolis, Ind.
Indiana, Illinois & Iowa R.R. 4-8½ g. 104 m. 5 lo. 83 c.
F. M. Drake, *Pres*.......... ....Kankakee, Ill.
T. P. Shonts, *Gen. Supt*........ Kankakee, Ill.
R. C. Ackley, *M. M*..............Kankakee, Ill.
Indiana & Illinois Southern Ry. 3 g. 91 m. 3 lo. 69 c.
W. C. Lyon, *Gen. Man. & P. Agt*. Robinson, Ill.
J. S. Pickering, *M. M. & C. B*.. Effingham, Ill.
Indianapolis, Decatur & Springfield Ry.
Geo. Bender, *Supt* ... .Indianapolis, Ind.
M. M.... ......Indianapolis, Ind.
Indianapolis & Evansville Ry. 4-8½ g. 54 m.
D. J Mackey, *Supt* .. ..Evansville, Ind.
Indianapolis & St. Louis R. R. (*See C., C., C. & I.*)
Indianapo. & Vincennes R.R. (*See Penna. Co.; (8) Div.*)
Intercolonial Ry. 4-8½ g. 873 m. 163 lo. 4,589 cars.
David Pottinger, *Chief Supt*.....Moncton, N. B.
T. V. Cook, *Gen. Storekeeper*...Moncton, N. B.
H. A. Whitney, *Mech. Supt*......Moncton, N. B.
Ewd. D. Shaffer, *M. C. B* ....Moncton, N. B.
M. & C. Dist.: J. E. Price, *Supt*. Campbellton, N. B.
Hal. & St. J. Div.: J. J. Wallace, *Supt*..Truro, N. S.
Q. & St. F. Div.: A. R. McDonald, *Supt*. Riv. du Lp. Q.
International Ry. 4-8½ g. 69 m. 7 lo. 12 cars.
D. E. McFee, *Supt*............Sherbrooke, P. Q.
J. Ruelle, *M. M*.......... ..Sherbrooke, P. Q.
W. Charest, *M. C. B*.........Sherbrooke, P. Q.
International & Gt. N'n R. R. (*See Mo. Pac.; (5) Div.*)
Iowa Falls & Sioux City R. R. (*See Ill. Cen.*)
Iron Mountain & Helena R. R. (*See Mo. Pac.; (4) Div.*)
Ithaca, Auburn & Western Ry. (*See Southern Cen.*)

J

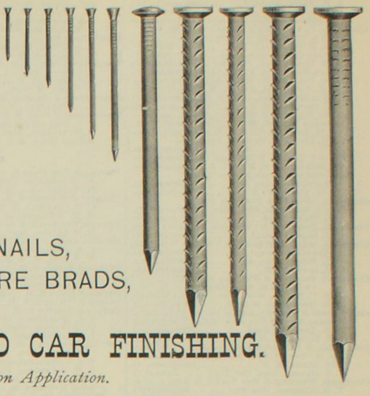
Jacksonville So.-E'n R. R. 4-8½ g. 54 m. 5 lo. 69
E. S. Greenleaf, *Supt*...........Jacksonville, Ill.
Ira F. Petrie, *M. M*............Jacksonville, Ill.
Jacksonville, St. Augustine & Halifax River Ry.
3 g. 76 m. 3 lo. 27 cars
W. L. Crawford, *Gen. Man*..Jacksonville, Fla.
E. T. Silvius, *M. M* ....Jacksonville, Fla.
Jacksonv., Pensacola & Mob. (*See Fla. Cent. & W.*)
Jacksonville, Tampa & Key West Ry. 5 g. 56 m.
G. W. Bentley, *Gen. Man*. ..Jacksonville, Fla.
M. R. Moran, *Supt*.......... .Jacksonville, Fla.
F. B. Hurlbut, *M. C. B*......Jacksonville, Fla.
Jamesville & Washington R. R. (*See Norfolk So'n.*)
Jeffersonv'l, Madison & Indpls. R. R. (*See (9) Pa. Co.*)
Jersey City & Albany R. R. 4-8½ g. 38 m.
J. W. McCulloh, *Manager* ...Jersey City, N. J.
Jersey City & Bergen R. R. 4-10 g. 21 m. 2 lo. 13 c.
T. M. Sayre, *Supt*.............Jersey City, N. J.

American Wire Nail Co.,

COVINGTON, KENTUCKY,

MANUFACTURERS EXCLUSIVELY OF

WIRE NAILS.



ESTABLISHED 1875.

INCORPORATED 1876.

J. L. STEPHENS,
President.

L. H. GEDGE,
Vice-President.

B. H. GEDGE,
Secretary.

FLAT, OVAL, OR DEPRESSED HEAD.
BLUED, BLACK OR BRIGHT.
BARBED STEEL WIRE NAILS,
AND STEEL WIRE BRADS,
FOR

CAR SIDING, CAR ROOFING AND CAR FINISHING.

Illustrated Catalogue and Price List sent on Application.

VAN DUSEN NUT LOCK.

A Perfect Nut Lock, Cheaper and Better than Jamb Nuts, or even Wooden Washers.

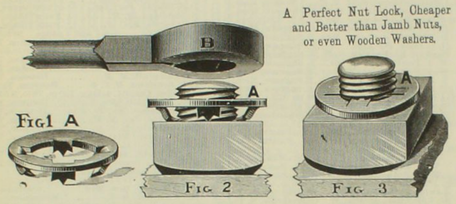


Fig. 1.—*A* represents nut lock detached. Fig. 2.—*A*, nut lock in position, ready to apply; *B*, the tool used in setting the lock—it is simply a bar of iron having a hole ⅛ inch larger than the bolt—when placed as indicated one or two smart blows with a hammer on the tool force the lock flat, the teeth entering the metal of the bolt. Fig 3.—*A* represents the lock applied.

Samples Furnished Free of Cost for Practical Tests. Difficult Tests Preferred.

MANUFACTURED BY

PEERLESS MFG. CO. Works: LOUISVILLE, KY.

SALES OFFICE: 15 GOLD STREET, NEW YORK.

Represented by THOMAS PROSSER & SON.

THE PRATT & WHITNEY CO.,

HARTFORD, CONN.,

MANUFACTURERS OF

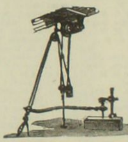
Machine Tools for Railway and General Machine Shops, Forging and Finishing Machinery, Corrugating Machines for Grooving Chilled Grinding Rolls, Lathes, Planers, Drilling Machines, Screw Machines, Milling Machines, Turret-Head Chucking, Bolt Cutting, Nut Tapping and Cutting off Machines.

Plants complete for Gun and Sewing Machine Manufacture, and **Special Machinery for Every Purpose.**

Master Car-Builders' U. S. Standard Thread Gauges, U. S. Standard Taps and Dies, both Hand and Machine, M. C. B. Standard Bar Iron Limit Gauges. Standard Cylindrical Size Gauges, Drop Forged Steel Caliper Gauges. Standard Hand, Shell and Chucking Reamers. Hardened and Ground Mandrels, and Every Appliance in Tools or Special Gauges necessary for Standard Interchangeable Work. Combination Lathe Chucks, Renshaw Ratchet Drills.

Corundum Wheels of every size, shape or grade, in stock, or made to order.

☞ Send for Illustrated Catalogue.



PORTABLE Machines for Use by Bridge, Engine and Boiler Makers.

PORTABLE Drilling, Tapping, Boring, and Reaming Machines

PORTABLE Machines for Wood Boring, Polishing, and Emery Wheel Grinding.

STOW FLEXIBLE SHAFT Co., Limited,

1505-1509 PENNSYLVANIA AVENUE,

PHILADELPHIA, - - PA.

THE ADAMS & WESTLAKE MFG. CO.'S IMPROVED LOCOMOTIVE SIGNAL HEAD-LIGHTS.

For displaying Locomotive NUMBERS and COLORED TRAIN SIGNALS at night.

Makers of interior **CAR LAMPS** of latest design; **SWITCH, SIGNAL,** and **TAIL** Lamps; Railway **LANTERNS,** &c., in great variety.

SEND FOR ILLUSTRATED CATALOGUE.

THE ADAMS & WESTLAKE MANUFACTURING CO., CHICAGO.

45 Summer Street, Boston.

100 Beekman Street, New York

J. McGREGOR ADAMS, President. L. I. TODD, Vice-President. WM. DOW, Secretary. C. A. HITCHCOCK, Supt.

UNION BRASS MANUFACTURING COMPANY.

CHICAGO, ILL.,

MANUFACTURERS OF

CAR HARDWARE.

Special designs furnished for the Interior Decorations of day, night and parlor coaches. Trimmings of every description. Eastern Office, Room 91, No. 115 Broadway, New York

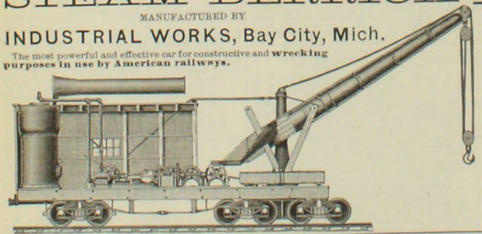
J. E. CROSS, Eastern Agent.

STEAM DERRICK AND WRECKING CAR,

MANUFACTURED BY

INDUSTRIAL WORKS, Bay City, Mich.

The most powerful and effective car for constructive and **wrecking purposes in use by American railways.**



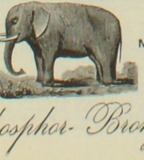
The **CHICAGO & WESTERN INDIANA RAILROAD** (the Belt Railway Co. of Chicago) says of it:

"*Our steam derrick has been in use twenty-nine times from Nov.* 1, 1883, *to Feb.* 1, 1884, *during which we have picked up* 58 *cars* (*box, etc.*), 1 *Pullman sleeper*, 2 *baggage cars and* 13 *engines, at a cost for labor of only* $535.37. *Comparing the difference in cost of repairs to cars or engines handled by this machine with the old manner of clearing track with a switch rope and pulling cars to pieces, we find the derrick has almost paid for itself. The best performance made by the derrick was to raise a* 52-*ton locomotive from its side on to wheels.*"

In use by
Michigan Central Railroad,
Canada Southern Railroad,
Atchison, Topeka & Sante Fe Railroad.

Designs for Derrick Machinery of lesser capacity and Hand-Derrick Cars furnished upon application.

PHOSPHOR-BRONZE,



TRADE MARKS: "*Phosphor-Bronze.*"

For Bearings of Locomotives, Cars and Machinery,

SLIDE VALVES, CYLINDER RINGS AND STEAM CONNECTIONS.

SAVES OIL AND REPAIRS, PREVENTS DELAY TO TRAINS, AND NEVER CUTS THE JOURNALS.

Phosphor
Bronze

Pamphlets and particulars on application to

THE PHOSPHOR-BRONZE SMELTING CO., Limited,

Office, 512 Arch Street, Philadelphia, Pa.

Owners of the United States Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the United States.

Jersey Shore, Pine Creek & Buff. Ry. (*See Phil. & R.*)
Junction & Breakwater R.R. (*See Del., Md. & Va.*

K

Kaaterskill R. R. 3 g. 8 m.
J. H. Jones, *Supt*.............Rondout, N. Y.
Kansas Central R. R. (*See Union Pacific.*
Kansas City, Fort Scott & Gulf R. R.
4-8½ g. 389 m. 75 l. 2,037 c.
Geo. H. Nettleton, *Gen. Man*..Kansas City, Mo.
L. W. Towne, *Supt*............Kansas City, Mo.
H. P. Jacques, *Pur. Agt*..... Kansas City, Mo.
J. S. McCrum, *M. M*..........Kansas City, Mo.
A. N. Montier, *M. C. B*.........Kansas City, Mo.
Kansas Cy, Lawrence & So. Kan. (*See At., Top. & S. F.*)
Kansas City, Springfield & Memphis R. R.
4-8½ g. 283 m. 10 lo. 456 cars.
George H. Nettleton, *Pres*...Kansas City, Mo.
L. W. Towne, *Supt*.............Kansas City, Mo.
H. P. Jacques, *Pur. Agt*.......Kansas City, Mo.
J. S. McCrum, *M. M*...........Kansas City, Mo.
A. N. Montier, *M. C. B*........Kansas City, Mo.
Kansas City, St. Joseph & Council Bluffs; and St. Jo. & Des Moines R. Rs. 4-8½ & 3 g. 368 m. 41 lo. 1,148 c.
J. F. Barnard, *Gen. Man*.........St. Joseph, Mo.
J. R. Hardy, *Supt*........St. Joseph, Mo.
D. H. Winton, *Asst. Supt*......St. Joseph, Mo.
A. B. Barnard, *Asst. Supt*....Kansas City, Mo
Wm. Irving, *Pur. Agt*............Chicago, Ill.
F. A. Chase, *M. M*.........St. Joseph, Mo
Thos. Aylesbury *?. For. Car. Dep*.St. Joseph, Mo
Kansas City & Southern Ry. 4-8½ g. In progress.
Wm. Bailey, *Pres*............Kansas City, Mo.
Kansas Coal Belt R. R. 4-8½ g. In progress.
C. H. Malin. *Gen. Man*...........Girard, Kan.
F. A. Hill, *Supt*..................Girard, Kan.
Kansas & Gulf Short Line R. R. 33 m. 2 lo. 32 cars.
Gen. Man..........Tyler, Tex.
V. K. Stevenson, *Pur. Agt*.....New York, N. Y.
Kent Northern Ry. 4-8½ g. 27 m. 2 lo. 16 cars.
J. C. Brown, *Gen. Man*.....Richibucto, N. B)
Kentucky Central R. R. (*See Ches. & Ohio.*
Kentucky & South Atlantic Ry. 3 g. 23 m. 3 lo. 52 c.
Geo. B. Harper, *Supt. & P. A*..Mt. Sterling, Ky
Geo. W. Lewis, *M. M*..........Mt. Sterling, Ky.
Keokuk & Des Moines R.R. (*See Chi., R. I. & Pac.*)
Kingston & Pembroke Ry. 4-8½ g. 104 m. 9 lo. 214 c.
B. W. Folger, *Supt*...............Kingston, Ont.
J. H. Taylor, *Pur. Agt*..........Kingston, Ont.
J. H. Taylor, *M. M*...............Kingston, Ont.
Knox & Lincoln R. R. 4-8½ g. 49 m. 6 lo. 119 cars.
C. A. Coombs, *Supt*..................Bath, Me.
Wm. A. Field, *M. M*...................Bath, Me.
C. L. Turner, *M. C. B*................Bath, Me.
Knoxville & Augusta R. R. 5 g. 16 m. 2 lo. 34 cars.
R. N. Hood, *Gen. Man. & P. Agt*.Knoxville, Tenn
J. M. Hood, *Supt*..............Knoxville, Tenn.

L

Lackawanna & Pittsburgh R. R. 3 g. 97 m.
Geo. W. Chapman, *Rec*.........Angelica, N. Y.
J. F. O'Brien, *Gen. Man*........Angelica, N. Y.
Lake Champlain & Moriah R.R. 4-8½ g. 8 m. 8 lo. 222c.
E. B. Hedding, *Supt*........Port Henry, N. Y.
Lake Erie & Western Ry. 4-8½ g. 388 m. 53 lo. 1,701 c.
J. H. Cheney, *Gen. Man*..... Bloomington, Ill.
D. S. Hill, *Gen. Supt*..........Bloomington, Ill.
T. H. Perry, *Pur. Agt*..........Bloomington, Ill.
H. L. Cooper, *Supt. of Equipment*....Lima, O.
Lake George & Muskegon River R. R.
4-8½ g. 20 m. 4 lo. 79 cars.
W. S. Gerrish, *Gen. Man*... Muskegon, Mich.
Lake Shore & Michigan So'n Ry.
4-8½ g. 1,340 m. 547 lo. 17,115 cars.
John Newell, *Pres*................ Cleveland, O.
P. P. Wright, *Gen. Supt*.........Cleveland, O.
L. G. Higgins, *Pur. Agt*..........Cleveland, O.
G. W. Stevens, *Supt. M. P*........Cleveland, O.
John Kirby, *Gen. M. C. B*.........Cleveland, O.
East'n Div.: C. B. Couch, *Supt*.....Cleveland, O.
J. S. Graham, *M. M*............ Buffalo, N. Y.
A. C. Robson, *M. C. B*......... Buffalo, N. Y.
L. O. Gassett, *M. M*............Cleveland, O.
J. Withycombe, *M. C. B*.........Cleveland, O.
Frank. Div.: G. H. McIntire, *Supt*.Youngstown, O.
Toledo Div.: Thos. Flesher, Jr., *Supt*.Cleveland, O.
J. M. Sanborn, *M. M*..............Norwalk, O.
W. O. Smith, *M. C. B*............ Norwalk, O.
Mich. Divs.: J. E. Curtis, *Supt*......... Toledo, O.
Det. Brs.: T. J. Charlesworth, *Supt* Detroit, Mich.
Lansing, Ypsilanti & Ft. Wayne Branches.
W. H. Caniff, *Supt*............Hillsdale, Mich.
Western Div.: A. G. Amsden, *Supt*...Chicago, Ill.
W. L. Gilmore, *M. M*............Elkhart, Ind.
Frank O. Bray, *M. C. B*.........Adrian, Mich.
Gr. Rap. Br.: M. E. Wattles, *Supt*.Kalamazoo, Mich.
Lake Tahoe R. R. 3 g. 10 m. 3 lo. 49 cars..
D. L. Bliss, *Gen. Man*...........Carson, Nev.
John T. Rogers, *Gen. Supt*...... Carson, Nev
Tho. Morris, *M. M*...............Carson, Nev.
Leavenworth, Topeka & So. W'n Ry. (*See A. T. & S. F.*)
Lebanon Springs R. R. 4-8½ g. 58 m. 5 lo. 44 c.
W. C. Alstyne, *Gen. Man*.........Albany, N. Y.
W. H. Hawkins, *Pur. Agt*........Albany, N. Y.
Geo. Tefft, *M. M*...............Chatham, N. Y.
Lehigh Valley R. R. 4-8½ g. 495 m. 392 lo. 36,998 c.
H. S. Goodwin, *Gen. Supt*.......Bethlehem, Pa.
W. C. Alderson, *Pur. Agt*.....Philadelphia, Pa.
John I. Kinsey, *M. M*.............So. Easton, Pa.
John S. Lentz, *M. C. B*..........Packerton, Pa.
N.J. Div.: Jas. Donnelly, *Supt*.Perth Amboy, N. J.
Coal Rds.: J. I. Blakeslee, *Supt*.Mauch Chunk, Pa.
D. Clark, *M. M*.....................Hazleton, Pa.
John Campbell, *M. M*.................Delano, Pa.
B. M. Div.: A. G. Brodhead, *S*..Mauch Chunk, Pa.
P. Hofecker, *M. M*.................Weatherly, Pa.
Wy. Div.: A. Mitchell, *S. & M. M.* Wilkesbarre, Pa.
Pa. & N. Y.: and Geneva, Ithaca & Sayre R. Rs.
Wm. Stevenson, *Gen. Supt*..........Sayre, Pa.
J. N. Weaver, *M. M*...................Sayre, Pa.
Jno. S. Lentz, *M. C. B*..........Packerton, Pa.
Lehigh & Hudson River Ry. 4-8½ g. 63 m. 8 lo. 350 c.
Grinnell Burt, *Gen Man*........Warwick, N. Y.
N. L. Furman, *Supt*..........Warwick, N. Y.
John Sayre, *Pur. Agt*..........Warwick, N. Y.
S. Mills, *M. M*...................Warwick, N. Y.
Lehigh & Lackawanna and Lehigh & Susquehanna R. Rs. (*See Phil. & Read.; N. J. Cen. Div.*)
Levis & Kennebec R. R. (*See Quebec Cen.*)
Litchfield, Carrollton & Western R. R. 4-8½ g. 22 m.
H. S. Carroll, *Prest. & G. Man*..Carrollton, Ill.
Ligonier Valley R. R. 4-9 g. 11 m. 2 lo. 22 cars.
Thos. A. Mellon, *Gen. Manager*..Pittsburgh, Pa.
Geo. Senft, *Supt. & P. Agt*........Latrobe, Pa.
Little Miami R. R. (*See Penna. Co.'s Rds*; (8) *Div.*)
Little Rock, Miss. River & Texas Ry.
4-8½ g. 170 m. 12 lo. 299 cars.
H. Wood, *Gen Man*..........Little Rock, Ark.
F. A. Lister, *Gen. Supt*........Little Rock Ark.
F. Hufsmith, *M. M. & C. B*..........Argenta, Ark.
Little Rock & Fort Smith. 4-8½ g. 170 m. 13 lo. 360 c
Hy. Wood, *Gen. Man*...........Little Rock, Ark.
F. A. Lister, *Supt*...............Little Rock, Ark.
F. Hufsmith, *M. M. & M. C. B*.....Argenta, Ark
Little Saw Mill Run R. R. 3 & 4-8½ g. 8 m. 4 lo. 327 c.
T. Hartley, *Gen. Man*..........Banksville, Pa.
Long Island R. R. 4-8½ g. 352 m. 92 lo. 953 cars.
I. D. Barton, *Gen. Supt*..Long Island City, N. Y
Benj. Norton, *Pur. Agt*..Long Island City, N. Y.
C. A. Thompson, *M. M* Long Island City, N. Y.
Longview & Sabine Valley R.R. (*See Gal. Sab. & St. L.*)
Louisiana W'n R. R. (*See Cen. Pac.; G., H. & S. A. Div.*)
Louisville, Cin. & Lexington R. R. (*See Louis. & N.*)
Louis., Evans. & St. L. Ry. 4-8½ g. 254 m. 24 lo. 1,032 c.
Geo. F. Evans, *Rec*..............Louisville, Ky.
R. S. Minor, *Gen. Supt*.........Louisville, Ky.
F. P. Boatman, *M. M*............Evansville, Ind.
Louisville, New Albany & Chicago Ry.
4-8½ g. 479 miles 60 lo. 3,700 cars.
John B. Carson, *Gen. Man*.........Chicago, Ill
W. R. Woodard, *Gen. Supt*.......Chicago, Ill.
H. O. Nourse, *Pur. Agt*...........Chicago, Ill.
Josiah Bettis, *M. M*...........New Albany, Ind.
Chas. Coller, *M. C. B*..........New Albany, Ind.
C. C. F. Bent, *Supt. Trans*.......Lafayette, Ind.
Louisville, New Orleans & Tex. Ry. 455 m. In progress.
Jas. M. Edwards, *Gen. Man*...Memphis, Tenn.
M. Burke, *Gen. Supt*............Memphis, Tenn.
John Bradley, *Asst. Supt*.....New Orleans, La.
A. M. Cooke, *Pur. Agt*.........Memphis, Tenn.

E. D. Anderson, *M. M*..........Vicksburg, Miss.
J. J. Casey, *M. C. B*..........Vicksburg, Miss.
Louisville & Nashville R. R.
5 g. 2,186 m. 380 lo. 12,197 cars.
Reuben Wells, *Gen. Man*........Louisville, Ky.
J. T. Harahan, *Asst Gen. M*....Louisville, Ky.
Geo. F. Evans, *Supt*...........Louisville, Ky.
P. P. Huston, *Pur. Agt*..........Louisville, Ky.
Harvey Middleton, *Supt. Mach*..Louisville, Ky.
Louisv., Cin. & Lex. Divs.:
J. G. Metcalf, *Supt. Trans*......Louisville, Ky.
P. Leeds, *M. M*..................Louisville, Ky.
J. W. Luttrell, *M. M*...........Louisville, Ky.
J. G. Clifford, *M. M.* (2d & C. Div.). Bowling Grn. Ky.
Henderson Div.: J. Geddes, *Supt*.Henderson, Ky.
W. P. Pike, *M. M*..............Nashville, Tenn.
Nash. & D. Div.: J. Geddes, *Supt*.Nashville, Tenn.
Elkton & Guthrie:
J. Geddes, *Supt*..............Nashville, Tenn.
S. & N. A. Div.: Levi Hedge, *Supt*.Birmingham, Ala.
C. W. White, *M. M*........Birmingham, Ala.
Mob. & M.; N. Div. Pens. & Sel.; Sl. & Mont. R. Rs.:
B. C. Epperson, *Supt*......Montgomery, Ala.
J. N. Hall, *M. M.* (Mont. Shops). Montgomery, Ala.
N. O. Div.: O. M. Dunn, *Supt*...New Orleans, La.
Wm. Adair, *M. M*...................Mobile, Ala.
Memp. Div.: W. Colcamp, *Supt*.Memphis, Tenn.
J. V. Slusser, *M. M*............ Memphis, Tenn.
St. L. Div.: C. O. Parker, *Supt*. Montgomery, Ala.
Thos. Walsh, *M. M*..........Mt. Vernon, Ill.
Pensacola and So. Div. Pens. & Selma and P. & A. Rds.:
E. O. Saltmarsh, *Supt*...........Pensacola, Fla.
W. D. Robb, *M. M*...............Pensacola, Fla.
Louisville & Wadley R. R. 5 g. 10 m. 1 lo. 5 c.
J. H. Wilkins, *Supt. & Pur. Agt*.Louisville, Ga.

M

Macon & Brunswick R. R.
(*See E. Tenn., Vir. & Ga.; At. & Ga. Divs.*)
Maine Central R. R. 4-8½ g. 525 m. 82 lo. 2,168 c.
Payson Tucker, *Gen. Man*.........Portland, Me.
Amos Pillsbury, *M. M*..........Waterville, Me.
C. H. Kenison, *M. C. B*.............Augusta, Me.
Eastern Maine. 3 g. 19 m. 2 lo. 40 c.
L. L. Lincoln, *Supt*............Portland, Me.
Manchester & Keene R.R. 4-8½ g. 30 m. (*See Concord.*)
Manchester & Lawrence R. R. (*See Concord.*)
Manchester & North Weare R. R. (*See Concord.*)
Manhattan Ry. 4-8½ g. 32 m. 228 lo. 652 pass. c.
Frank K. Hain, *Gen. Man*.....New York, N. Y.
W. T. Goundie, *Supt. Trans*. .New York, N. Y.
T. W. Peeples, *M. M*..........New York, N. Y.
H. A. Webster, *M. C. B*........New York, N. Y.
Manitoba Southwestern Colonization Ry.
4-8½ g. 52 m. 3 lo. 125 cars.
J. M. Eagan, *V. Pres*...........Winnipeg, Man.
W. T. Reed, *M. M*..............Winnipeg, Man.
Marietta & Cincinnati R. R. (*See Cin. Wash. & Balt.*)
Marietta & North Georgia R. R. 3 g. 70 m. 4 lo. 45 c.
J. B. Glover, *Gen. Man*..........Marietta, Ga.
W. R. Power, *Pur. Agt*..........Marietta, Ga.
C. Chester, *M. M*.................Marietta, Ga.
Marquette, Houghton & Ontonagon R. R.
4-8½ g. 100 m. 42 lo. 2,530 cars.
John Hornby, *Gen. Man*.......Marquette, Mich.
W. A. Thompson, *Ass't Supt*.Marquette, Mich.
M. B. McGee, *Pur. Agt*.......Marquette, Mich.
W. A. Mahan, *M. M*..........Marquette, Mich.
H. D. Lyons, *M. C. B*........Marquette, Mich.
Maryland Central R. R. 3 g. 27 m. 4 lo. 56 cars.
S. G. Boyd, *Supt*.................Baltimore, Md.
Marquette & Western. 4-8½ g. 25 m. 10 l. 500 c.
D. McCool, *Gen. Supt*........Marquette, Mich.
W. J. Tench, *Pur. Agt*........Marquette, Mich.
J. B. Wilson, *Mech. Supt*......Marquette, Mich.
Massachusetts Central R. R. 4-8½ g. 48 m. 5 l. 81 c.
E. G. Allen, *Supt. & Pur. Agt*....Boston, Mass.
E. A. Walker, *M. M*.........So. Sudbury, Mass.
Memphis & Charleston R. R. (*See E. Tenn. Va. & Ga.*.
Memphis & Lit. Rock R. R. 5 g. 135 m. 14 lo. 299 c.
R. Fink, *G. Man. & P. A*......Little Rock, Ark.
H. G. Fleming, *Supt*............Memphis, Tenn.
Thos. Rennell, *M. M*..............Argenta, Ark.
T. Rennell, *M. C. B*..............Argenta, Ark.
Mexican Ry. 4-8½ g. 293 m. 42 lo. 616 cars.
E. W. Jackson, *Gen. Man*........Mexico, Mex.
Geo. Foote, *Gen. Supt*............Mexico, Mex.
Mexican Central Ry. 4-8½ g. 1,224 m. 94 lo. 2,609 c.
Theo. Nickerson, *Pur. Agt*......Boston, Mass.
E. W. Jackson, *Gen. Man*...El Paso del Norte.
D. MacKenzie, *Gen. Supt*......City of Mexico.
F. W. Johnstone, *Supt. M. P. & M*. City of Mexico.
J. H. O'Brien, *M. M*..........City of Mexico.
G. T. Jarvis, *Div. Supt*.........City of Mexico.
A. Smith, *Div. Supt*...............Silao, Mex.
I. A. Eacutt, *Div. Supt*..........Jimulco, Mex.
R. E. Comfort, *Div. Supt*..Paso del Norte, Mex.
R. S. Simpson, *M. M*............City of Mexico.
A. Hendee, *M. M*.................Calera, Mex.
C. F. Stewart, *M. M*...............Silao, Mex.
W. L. Wallace, *M. M*.............Jimulco, Mex.
J. G. McCuen, *M. M*...........Chihuahua, Mex.
Tampico Div: E. A. Whorf, *Supt*.Tampico, Mex.
San Blas Div.: C. E. Payne, *Supt*..San Blas, Mex.
Mexican National Ry. 3 g. 766 m. 50 lo. 1,283 c.
Northern General Division:
D. C. Dodge, *V. P. & Gen. Man*...Laredo, Tex
C. A. Merriam, *Gen. Supt*.......Laredo, Tex.
F. W. Baldwin, *Asst. Gen. Supt*..Laredo, Tex.
John Grace, *M. M*...................Laredo, Tex.
T. Milan, *M. M*.............Corpus Christi, Tex.
Metamoras, Div.:
W. W. Mayberry, *Asst. Supt*..Brownsville, Tex.
Galveston Div.:
T. E. Quinn, *Asst. Supt*......Galveston, Tex.
Southern General Division:
W. E. Lewis, *Supt*...............Mexico, Mex.
R. C. Peebles, *Asst. Supt*........Mexico, Mex.
J. M. Winslow, *M. M*............Mexico, Mex.
Zacatecas Div.:
C. Langrand, *Manager*.........Zacatecas, Mex.
Michigan Cen. R. R. 4-8½ g. 1,485 m. 357 lo. 11,284 c.
H. B. Ledyard, *Pres. & Gen. Man*.Detroit, Mich.
E. C. Brown, *Gen. Supt*..........Detroit, Mich.
Robert Miller, *Asst. Gen. Supt*...Detroit, Mich.
Allan Bourn, *Pur. Agt*............Detroit, Mich.
C. E. Smart, *Gen. M. M*..........Jackson, Mich.
(1) Lines West of Detroit River:
E. C. Brown, *Gen. Supt*........Detroit, Mich.
East. Div.: D. S. Sutherland, *Supt*.Detroit, Mich.
Bay City, Saginaw & Mackinaw Divisions.:
W. A. Vaughan, *Supt*.........Bay City, Mich.
C. E. Smart, *M. M*.............Bay City, Mich.
Main Line: Gr. Rap.; So. Bend; and So. Hav. Divs.:
C. B. Bush, *Supt*............Jackson, Mich.
W'n Divs.: R. H. L'Hommedieu, *Supt*.Chicago, Ill.
(2) Lines East of Detroit River:
J. B. Morford, *Supt*,........St. Thomas, Ont.
A. F. Bull, *M. M*.............St. Thomas, Ont.
Rob't Potts, *M. C. B*.........St. Thomas, Ont.
Michigan & Ohio.
L. A. Latcha, *Gen. Man*..............Toledo, O.
W. L. Webb, *Pur. Agt*...............Toledo, O.
D. J. Durrell, *M. M*........... Marshall, Mich.
Middleburg & Schoharie; and Schoharie Valley R. Rs. 4-8½ g. 11 m. 2 lo. 6 cars.
P. S. Danforth, *Gen. Supt*... Middleburg, N. Y.
Midland of Canada. (*See Grand Trunk.*)
Midland No. Carolina Ry. 5 g. 95 m. 9 lo. 82 cars.
Atlantic & North Carolina Ry. 22 m.
John D. Whitford, *Gen. Man*..Newbern, N. C.
J. A. Bryan, *Supt*................Newbern, N. C
D. J. Sprague, *Pur. Agt*.......New York, N. Y.
B. Manly, *Supt. of Mach*.........Newbern, N. C.
Milford & Woonsocket.
W. W. Jencks, *Supt*.............Milford, Mass.
Milton & Sutherlin. (*Oper. by Rich. & Danville.*)
Milwaukee, Lake Shore & Western Ry.
4-8½ g. 370 m. 45 lo. 1,536 cars.
H. F. Whitcomb, *Gen. Supt*...Milwaukee, Wis
J. Donahue, *Supt*...............Milwaukee, Wis.
John Hickey, *M. M*................Ledyard, Wis.
Milwaukee & Northern and Wisconsin & Michigan R. Rds. 4-8½ g. 228 m. 24 l. 703 cars.
C. F. Dutton, *Gen. Supt*........Milwaukee, Wis.
N. S. Kimball, *M. M*.........Ft. Howard, Wis.
Mineral Range R. R. 3 g. 13 m. 4 lo. 43 cars
Chas. E. Holland, *Pr. & Supt*...Hancock, Mich.
C. A. Wright, *Gen. Man*........Hancock, Mich.
W. H. Carr, *Pur. Agt*...........Hancock, Mich.
T. J. Shellhorn, *M. M. & C. B*..Hancock, Mich.
Minneapolis, Lyndale & Minnetonka Ry.
3 g. 25 miles 4 motors 1 lo. 35 cars.
William McCrory, *Man*.....Minneapolis, Minn.
T. W. Heintzelman, *M. M*.. Minneapolis, Minn.
Minneapolis, S. Ste. Marie & Atlantic Ry.
4-8½ g. 45 m.
W. W. Rich, *Supt*..........Minneapolis, Minn.
Minneapolis & St. Louis Ry.
4-8½ g. 560 m. 72 lo. 2,060 c.
W. H. Truesdale, *V. Pres*..Minneapolis, Minn.
T. E. Clarke, *Gen. Supt*....Minneapolis, Minn.
W. B. Palmer, *Pur. Agent* Minneapolis, Minn.
G. F. Wilson, *M. M. & M. C. B*.Minneapolis, Minn
Missisquoi R. R. 4-8 g. 28 m.
W. C. Smith, *Man*...............St. Albans, Vt.
Mississippi, Terre aux Bœufs & Lake R. R.
29 miles.
M. R. Spelman, *Supt*..........New Orleans, La.
Mississippi & Tenn. R. R. 4-8½ g. 101 m. 12 lo. 194 c.
Jas. M. Edwards, *Gen. Man*....Memphis, Tenn.
J. C. Ramsey, *M. M*..............Memphis, Tenn.
S. J. Bolton, *M. C. B*............Memphis, Tenn.
Missouri, Iowa & Nebraska R. R. 4-8½ g. 143 m.
H. T. Clark, *Supt*.............Alexandria, Mo.
Missouri, Kansas & Texas Ry. (*See Mo. Pac.*; (2) *Div.*)
Missouri Pacific Ry. (Leased and operated lines.)
4-8½ g. 6,029 m. 697 lo. 19,748 cars.
H. M. Hoxie, *3d V. Pres*..........St. Louis, Mo.
R. B. Lyle, *Pur. Agt*..............St. Louis, Mo.
(1), (2) and (3) Divs.:
John Hodge, *Supt. Car Dep*.......St. Louis, Mo.
Frank Howard, *Asst. Supt. C.D*...Marshall, Tex.
(4), (5) and (6) Divs.:
O. A. Haynes, *Insp. L. C. & M*...St. Louis, Mo.
(1) Missouri Pacific Ry. 1,028 m. 155 lo. 4,218 cars.
E. K. Sibley, *Supt*..................Sedalia, Mo.
T. W. Newell, *M. M*.................Sedalia, Mo.
E. Taylor, *Asst M. M*...............Sedalia, Mo.
W'n Div.: M. C. Straight, *Supt*.......Sedalia, Mo.
L. Bartlett, *M. M*.................St. Louis, Mo.
(2) Mo., Kan. & Tex. Ry. 1,308 m. 140 lo. 4,248 cars.
Jos. Herrin, *Supt*..................Sedalia, Mo.
J. J. Frey, *Div. Supt*................Sedalia, Mo.
T. G. Golden, *Div. Supt*.........Parsons, Kan.
S. Irvin, *Asst. Supt. Car Dep*.......Sedalia, Mo.
E. K. Sibley, *Supt*...............Parsons, Kan.
W. E. Phillips, *M. M*..............Parsons Kan.
(3) Central Branch Un. Pac. R. R. 388 m. 30 lo. 599 c.
W. W. Fagan, *Supt*...............Atchison, Kan.
H. V. Faries, *M. M*...............Atchison, Kan.
J. W. Blackburn, *A. Supt. Car D*..Atchison, Kan.
(4) St. L., I. Mt. & So'n Ry. 905 m. 138 lo. 4,928 c.
Wm. Kerrigan, *Supt*..............St. Louis, Mo.
St. Louis Div.: W. H. Harris, *M. M*..De Soto, Mo.
Ark. Div.: *Supt*.......Little Rock, Ark
R. M. Richardson, *M. M*.....Little Rock, Ark.
(5) Int. & G. No.: *Supt*..Palestine, Tex
M. M...........Palestine, Tex.
(6) Tex. & Pac: Warder Cumming, *Supt*.Marshall, Tex.
E. N. O. & Tr. Cont. Divs.:
Geo. Dimick, *Supt*..............Marshall, Tex.
E. R. Smith, *M. M. & M. C. B*..N. Orleans, La.
Rio Grande Div.:
L. L. Keller, *Supt*............Big Springs, Tex.
Mobile & Ala. Grand Trunk R. R. 5 g. 59 m. 2 lo. 23 c.
Wm. H. Pratt, *Trustee*..............Mobile, Ala.
Mobile & Girard R. R. 5 g. 84 m. 7 lo. 112 cars
W. L. Clark, *Gen. Supt*...........Columbus, Ga.
J. C. Albrecht, *M. M*..............Columbus, Ga.
A. J. Nix, *M. C. B*..................Columbus, Ga.
Mobile & Montgomery Ry. (*See Louis. & Nash.*)
Mobile & Northwestern R. R. 3 g. 31 m. 2 lo. 16 c.
Thomas T. A. Lyon, *Pres*.......Glendale, Miss.
Mobile & Ohio R. R. 5 g. 528 m. 75 lo. 1,353 cars.
T. M. R. Talcott, *V.-Pr. & Gen. Man* Mobile, Ala.
J. G. Motley, *Gen. Supt*.............Mobile, Ala.
F. Jordan, *Pur. Agt*.................Mobile, Ala.
M. T. Carson, *Gen. M. M*..........Whistler, Ala.
J. T. Booth, *M. C. B*..............Whistler, Ala.
So'n Div.:................................Mobile, Ala.
L. J. Morris, *M. M*.................Macon, Miss.
No'n Div.: E. S. Hosford, *Supt*.. Jackson, Tenn.
H. C. Goode, *M. M*.............Jackson, Tenn.
Mobile & Spring Hill R. R. 5-2 g. 8 m. 1 lo. 16 cars.
F. Ingate, *Manager*....................Mobile, Ala.
Moline & Southeastern R. R. 3-6 g. 8 m. 2 lo. 26 c.
R. Battersly, *Gen. Man*.........Coal Valley, Ill.
Mont Alto R. R. 4-9 g. 21 m. 2 lo. 8 cars.
G. B. Wiestling, *Supt. & P. A*....Mont Alto, Pa.
Montgomery & Eufaula Ry. (*See Cen. of Ga.*)
Montgomery Southern Ry. 3 g. 20 m. 1 lo. 15 cars.
S. D. Hubbard, Jr., *Gen. Man*.Montgomery, Ala.
Montour R. R. 4-8½ g. 12 m. 2 lo. 130 cars.
C. R. Brown, *Supt. & Pur. Agt*..Imperial, Pa.
Henry Newman, *M. C. B*........Imperial, Pa.
Montpelier & Wells Riv. R. R. 4-8½ g. 38 m. 3 lo. 86c.
W. A. Stowell, *Supt*...............Montpelier, Vt.
Montreal Portland & Boston Ry. (*See Passumpsic.*)
Montreal & Sorel Ry. 4-8½ g. 47 m. 3 lo. 35 c.
C. N. Armstrong, *G. M. & Pur. Agt*.Sorel, P. Q.
J. F. Armstrong, *Gen. Supt*.........Sorel, P. Q.
G. W. Pangborn, *M. M*..............Sorel, P. Q.
Montrose Ry. 3 g. 28 m. 3 lo. 24 cars.
T. G. Walter, *Gen. Supt*... Tunkhannock, Pa.
Morgan's Louis. & Tex. R. R. 4-8½ g. 260 m. 46 l. 1,339 c.
J. Kruttschnitt, *Supt*.........New Orleans, La.
C. Trumpy, *Pur. Agt*......... New Orleans, La.
J. D. Connell, *M. M*...............Algiers, La.
Jno. Hildebrand, *M. C. B*.......... Algiers, La.
Mount Washington R. R. 5-3 g. 3 m. 6 lo. 6 cars.
Walter Aiken, *Gen. Man*........Franklin, N. H.

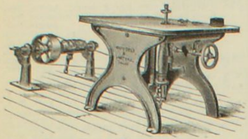
N

Nantasket Beach R. R. 4-8½ g. 6 m. 5 lo. 25 c.
George L. Keyes, *Gen. Supt*......Boston, Mass.
Naugatuck R. R. 4-8½ g. 62 m. 17 lo. 547 cars.
Geo. W. Beach, *Supt*........Waterbury, Conn.
H. A. Bishop, *Pur. Agt*.......Bridgeport, Conn.
H'y D. Beach, *Supt. R. S*....Bridgeport, Conn.
Napanee, Tamworth & Quebec Ry. In progress.
Ed. W. Rathbun, *Gen. Man*....Deseronto, Ont
R. C. Carter, *Asst. Gen. Man*..Deseronto, Ont.
Narragansett Pier R. R. 4-8½ g. 8 m. 2 lo. 11 c.
G. T. Lanphear, *Supt. & Pur. Agt*.Peacedale, R.I.
Nashua & Rochester R. R. (*See Wor. & Nash.*)
Nashville, Chattanooga & St. Louis Ry.
5 g. 539 miles 87 lo. 1,979 cars.
J. W. Thomas, *G. Man. & P. Agt*.Nashville, Tenn.
M. J. C. Wrenne, *Supt*..........Nashville, Tenn.
James Cullen, *M. M. & C. B*...Nashville, Tenn.
Nashville & Florence R. R. 5 g. 51 m.
J. Geddes, *Supt*..................Columbia, Tenn.
Natchez, Jackson & Col. R. R. 3-6 g. 100 m. 7 lo. 92 c.
E. D. Frost, *Gen. Supt*........... Natchez, Miss.
Nebraska, Topeka, Iola & Memphis R.R. 4-8½ g. 16 m.
H. M. Clarke, *Gen. Man*.............Girard, Kan.
C. H. Malin, *Gen. Supt*.............Girard, Kan.
New Brunswick Ry. 4-8½ g. 447 m. 40 lo. 935 cars.
F. W. Cram, *G. M. & Pur. Agt*..St John, N. B.
Geo. A. Haggerty, *M. M*........McAdam, N. B.
Jas. Jackson, *Asst. M. M*.......McAdam, N. B.
New Brunswick & Can. Ry. (*See New Brun.*)
Newburg, Dutchess & Conn. R. R. 4-8½ g. 58 m.
C. L. Kimball, *Supt. & P. Agt*.Matteawan, N. Y.
New Castle R. R. 3-6 g. 5 m. 2 lo. 76 cars.
Geo. Pearson, *Gen. Man*........New Castle, Pa.
New Castle & Beaver Valley R. R. (*See Penna. Co.*)
New Haven & Derby R. R. 4-8½ g. 13 m. 4 lo. 70 c.
E. S. Quintard, *Supt*..........New Haven, Conn.
J. M. Whitlock, *M. M. & C. B*.New Haven, Conn.
New Haven & No'mpton. 4-8½ g. 170 m. 28 lo. 579 c
S. B. Opdyke, Jr., *Supt*.........New Haven, Ct.
R. G. Curtis, *Pur. Agt*.......... New Haven, Ct.
Henry Fox, *M. M*................New Haven, Ct.
John Sweeny, *For Car. Shps*...New Haven, Ct.
New Jersey & New York Ry. 4-8½ g. 37 m. 6 lo. 40 c.
J. D. Hasbrouck, *Gen. Man* Jersey City, N. J.
J. S. Drake, *Supt. & M. M*.......Hillsdale, N. J.
L. B. Van Wagonen, *M. C. B*.....Hillsdale, N. J.
N. J. Southern Ry. (*See Phil. & Read.; N. J. So. Div.*)
New London Northern R. R. (*See Central Ver.*)
New Orleans, B. Rouge, Vicks. & Memphis.
Jas. M. Edwards, *Gen. Man*..New Orleans, La.
John Bradley, *Supt*.............New Orleans, La.
New Orleans Pacific Ry. (*See Mo. Pac.*; (6) *Div.*)
New Orleans & Carrollton R. R.
4-8½ g. 15 m. 12 lo. 79 cars.
C. V. Haile, *Supt*..............New Orleans, La.
John Dahmer, *M. M*..........New Orleans, La.
Jas. Thorn, *M. C. B*.........New Orleans, La.
New Orleans & Mobile R. R. (*See Louis. & Nash.*)
N.O. & Northeastern R. R. (*See Cin., N. O. & Tex. Pac.*)
New Orleans & Selma R. R. 5 g. 21 m. 1 lo. 8 cars.
L. B. Schofield, Supt...............Selma, Ala.
Newport & Wickford R. R. 4-8½ g. 22 m.
Theo. Warren, *Supt*...............Newport, R. I.
Nevada Central R. R.:
C. W. Hinchcliffe, *Rec. & Supt*...Austin, Nev.
Louis Parisoe, *M. M*.....Battle Mountain, Nev.
J. B. Gilchrist, *Pur. Agt*.........Austin, Nev.
Nevada County N. G. R. R. 3 g. 23 m. 3 lo. 46 cars.
John F. Kidder, *Supt*........Grass Valley, Cal.
Jas. McCormick, *M. M. & C. B*.Grass Valley, Cal.
Nevada & Oregon R. R. 3 g. 30 m. 25 cars.
D. W. Balch, *Supt*..................Reno, Nev.
N. Y. Central & Hudson River R.R.
4-8½ g. 983 m. 676 lo. 25,161 cars.
J. M. Toucey, *Gen. Supt*...... New York, N. Y.
Chas. Reed, *Pur. Agt*........ New York, N. Y.
Wm. Buchanan, *Supt. M. P. and R. Stock*,
New York, N. Y.
N. Y. & Har. Div.: C. M. Bissell, *Supt*. do.
P. McQ. Gibson, *M. M*.......New York, N. Y.
Hud. Riv. Div.: C. M. Bissell, *Supt*.N. York, N. Y
W. H. Wolfrath, *M. C. B*....New York, N. Y.
E'n Div.: Zenas C. Priest, *Supt*.Little Falls, N. Y.
John Ortton, *M. M*..........West Albany, N. Y.
L. Packard, *M. C. B*......West Albany, N. Y.
W'n Div.: Geo. H. Burrows, *Supt*...Buffalo, N. Y.
S. L. White, *M. M*..............Syracuse, N. Y.
Amos Gould, *M. M*............E. Buffalo, N. Y.
E. Chamberlain, *M. C. B*... E. Buffalo, N. Y.
Peter Smith, *M. C. B*..... E. Rochester, N. Y.
Rd. Donaby, *M. C. B*....Niagara Falls, N. Y
N. Y. Chic. & St.L. Ry. 4-8½ g. 524 m. 108 lo. 7,245 c
Lewis Williams, *Gen. Man*..... Cleveland, O
M. M. Rogers, *Pur. Agt*..........Cleveland, O.
Jno. Mackenzie, *Supt. M. P*......Cleveland, O
Eas'tn Div.: G. H. Kimball, *Supt*...Cleveland, O
E. A. Miller, *M. M*..................Conneaut, O
West'n Div.: C. D. Gorham, *Supt*....Chicago, Ill.
W. H. Lewis, *M. M*............Englewood, Ill.
New York City & Northern. 4-8½ g. 58 m. 17 lo. 368 c
Frank S. Gannon, *Gen. Supt*.High Bridge, N. Y.
Thos. Millen, *M. M*..........High Bridge, N. Y.
New York, Lackawanna & W'n Ry. (*See Del. L. & W.*)
New York, Lake Erie & Western R. R.
S. M. Felton, Jr., *V. Pr*....... New York, N. Y.
(1) N.Y., L.E. & W. Div.: 4-8½ g. 1,073 m. 576 lo. 30,553 c.
B. Thomas, *Gen. Supt*........Jersey City, N. J.
W. G. Tuller, *Pur. Agt*........New York, N. Y.
F. M. Wilder, *Supt. M. P. & M*...Susqueh'a, Pa.
E'n Div.: E. O. Hill, *Supt*......Jersey City, N. J.
J. H. Vreeland, *M. M*...... Jersey City, N. J.
J. N. Mileham, *M. C. B*.....Jersey City, N. J.
Del. Div.: E. Van Etten, *Supt*..Port Jervis, N. Y.
J. Van Vechten, *M. M. & C. B*.Pt. Jervis, N. Y.
Susq. Div.: R. B. Cable, *Act. Supt*..Elmira, N. Y.
V. Blackburn, *M. M*.........Susquehanna, Pa
D. B. Goodell, *M. C. B*...........Elmira, N. Y
Buf. & R. Divs.: W. J. Murphy, *Supt*.; and
Wm. Litz, *M. M*.....................Buffalo, N. Y.
Robert Gunn, *M. C. B*..........Buffalo, N. Y.
B. & S.-W. Div.: C. A. Brunn, *Supt*. do.
W'n Div.: W. B. Coffin, *Supt*..Hornellsville, N. Y.
J. Hawthorne, *M. M*......Hornellsville, N. Y.
N. Y. & Greenwood L. Ry. 4-8½ g. 44 m. 8 lo. 53 c.
Stephen Smith, *Supt*...........Jersey City N. J.
F. A. Stinard, *M. M*..............Pompton, N. J.
(2) N.Y., Pa & O. Div.: 4-8½ g. 565 m. 221 lo. 7,794 c.
Chas. Paine, *Gen. Supt*.........Cleveland, Ohio.
J. H. Holway, *Pur. Agt*.........Cleveland, Ohio.
Wm. Fuller, *Supt. M. P*..........Cleveland, O.
S. V. Smith, *Asst. Gen. M. C. B*....Kent, Ohio.
E'n Div.: A. L. Dunbar, *Supt*........Meadville, Pa.
J. A. Cooper, *M. M*..............Meadville, Pa.
D. S. Dockstader, *M. C. Rep*...Meadville, Pa
W'n Div.: A. M. Tucker, *Supt*.......... Galion, O.
Wm Hill, *M. M*.........................Galion, O.
Geo. Wilson, *For. Car Rep*.......Galion, Ohio.
Maho'g Div.: N. F. Wood, *Supt*.......Cleveland, O.
N. Wright, *M. M*.................Cleveland, O.
C. N. Thorp, *M. C. Rep*..........Cleveland, O
New York, New Haven & Hartford R. R.
4-8½ g. 203 m. 123 lo. 2,768 cars.
E. M. Reed, *V. P. & Gen. Supt*.New Haven, Ct.
R. N. Dowd, *Pur. Agt*..........New Haven, Ct.
John Henney, Jr., *Supt. M.P*...New Haven, Ct.
N. Y. & N. H. Div.: W.H. Stevenson, *Supt*...N. Y.
Shore Line and Air Line Divs.:
W. A. Waterbury, *Supt*.....New Haven, Ct.
Jas. Denver, *M. C. B*.........New Haven, Ct.
Hart. Div.: C. S. Davidson, *Supt*....Hartford, Ct
O. C. Lackey, *M. M*...............Hartford, Ct
Jno. Whitmore, *For. C. Dept*...Hartford, Ct.
N.Y., Ontario & Western Ry. (*See N. Y., W. Sh. & Buf.*)
N. Y., Pittsb'h & Chicago. 4-8½ g. 20 m. 2 lo. 32 c.
Geo. W. Dixon, *Supt*...........New Galilee, Pa.
H. T. Hanna, *Pur. Agt*..........Pittsburgh, Pa.
N.Y., Pennsylvania & Ohio R. R. (*See N. Y., L. E. & W.*)
New York, Philadelphia & Norfolk R. R.
4-8½ g. 10 m. 1 lo. 4 cars.
H. W. Dunne, *Supt*..........Cape Charles, Va.
New York, Providence & Boston R. R.
4-8½ g. 83 m. 29 lo. 430 cars.
J. B. Gardner, *Supt*.............Providence, R. I.
J. L. Hayden, *Pur. Agt*......Stonington, Conn.
Geo. H. Griggs *M. M. & C. B*..Providence, R. I.
N. Y., Susqueh'na & W'n. 4-9 g. 147 m. 33 lo. 1,469 c.
F. A. Potts, *Gen. Man*.........New York, N. Y.
C. D. McKelvey, *Supt*.........Jersey City, N. J.
C. T. Demarest, *Pur. Agt*.....New York, N. Y.
W. C. Ennis, *M. M. & C. B*...Wortendyke, N. J.
New York, Texas & Mexican Ry.
4-8½ g. 92 m. 6 lo. 95 cars.
M. D. Monserate, *Gen. Man*....Victoria, Tex.
J. G. Conlon, *M. M*..................Victoria, Tex
New York, West Shore & Buffalo.
4-8½ g. 850 m. 177 lo. 7,291 c.
J. D. Layng, *Gen. Man*........New York, N. Y.
C. W. Bradley, *Gen. Supt*.....Weehawken, N.J.
P. S. Bemis, *Pur. Agt*.........New York, N. Y.
R. H. Soule, *Supt. M. P*......Frankfort, N. Y.
H.R. Div.: J. P. Bradfield, *Act. Supt*., Weehawken, N.J
Thos. Oldcorn, *M. M*.....New Durham, N. J.
Buff. Div.: D. B. M. Coy, *Supt*.....Newark, N. Y.
N. Falls Div.: W. J. Murphy, *Supt*. Buffalo, N. Y.
Coeymans to Newark.
Jas. M. Boon, *M. M*............Frankfort, N. Y.
Newark to Buffalo.
Geo. W. West, *M. M*....... East Buffalo, N. Y
New York, Ontario & Western.
J. E. Childs, *Gen. Supt*.........New York, N. Y.
N. Y. Woodhaven & Rockaway R. R. (*See Long Is.*)
N. Y. & Greenwood Lake Ry. (*See N. Y., L. E. & W.*)
N. Y. & Manhattan Beach Ry. (*See Long Island.*)
New York & Long Branch R. R. (*See Phil. & Read.*)
New York & New England R. R.
4-8½ g. 473 m. 145 lo. 3,959 cars.
W. H. Turner, *Gen. Supt*....... Boston, Mass.
W. W. McKim, *Pur. Agt*......Boston, Mass.
J. B. Henney, *Supt. M. P*....... Boston, Mass.
W. H. Griggs, *M. M*..............Norwood, Mass.
Elias E. Pratt, *M. C. B*.........Norwood, Mass
East Div: E. G. Allen, *Supt*........Boston, Mass.
Nor. Div.: P. St. M. Andrews, *Supt*...Norwich, Ct
S. F. Whaley, *M. M*..................Norwich, Ct.
Prov. Div.: L. W. Palmer, *Supt*..Providence, R. I.
Hfd. Div.: E. Holbrook, *Supt*.......Hartford, Ct.
E. M. Humstone, *M. M*.........Hartford, Ct
West'n Div.: C. H. Platt, *Supt*.....Fishkill, N. Y.
Woons'kt Div.:
E. N. Tucker, *Supt*...........Needham, Mass.
New York & Sea Beach R R. 4-8½ g. 6 m. 6 lo. 41 c.
W. O. McDowell, *Gen. Man*... New York, N. Y.
C. W. Douglass, *Gen. Supt*... Bay Ridge, N. Y.
Newark, Somerset & Straitsville R. R. (*See B. & O.*)
Newburg, Dutchess & Conn. R. R. 4-8½ g. 59 miles.
C. L. Kimball, *Gen. Supt*.....Matteawan, N. Y
W. G. Van Buskirk, *M. M. & C. B.*,
Dutchess Junction, N. Y
Newfoundland Ry. 3-6 g. 45 m. 7 lo. 41 c.
C. X. Hobbs, *Gen. Man*.........St. John's, N'f'd
Norfolk Southern R. R. 4-8½ g. 74 m. 7 lo 182 c.
M. K. King, *Gen. Man. & Pur. Agt*.Norfolk, Va.
J. S. Whitworth, *M. M. & C. B*....Norfolk, Va.
Norfolk & Ocean View R. R. & Hotel Co.
3 g. 8 m. 2 lo. 9 cars.

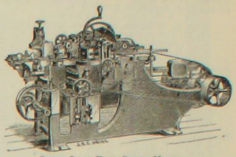
WOOD-WORKING MACHINERY

FOR

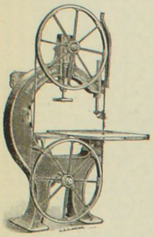
PLANING MILLS,
CAR SHOPS,
RAILWAY SHOPS,
BRIDGE BUILDERS,
Etc., Etc.



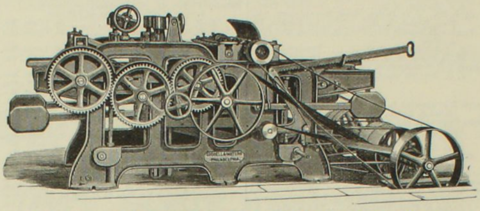
Single Spindle Upright Shaper.



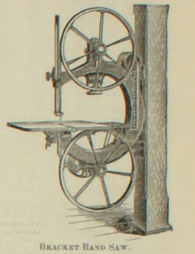
Seven-Inch Four-Sided Molder.



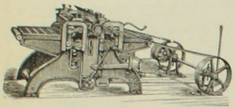
35-Inch Band Saw.



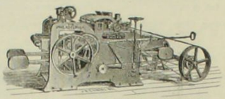
CAR SILL PLANER AND DOUBLE-SURFACER AND JOINTER.



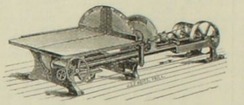
Bracket Band Saw.



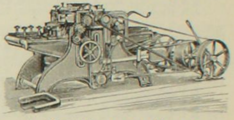
No. 2 Single Surfacer.



"The Philadelphia" Endless Bed D. S.



New Railway Cut-Off Saw.



No. 2 Single Surfacer and Matcher.

GOODELL & WATERS,

SEND FOR CATALOGUE. Philadelphia, Penn.

THE LAUFMAN SCREW-BRAKE FOR FREIGHT OR PASSENGER CARS.

USES NO DOG OR RATCHET. Can be set from the ground as well as from top of Car; can be made for Inside or Outside Brake; applies and releases almost instantly; remains as set. ☞ **JARRING WILL NOT RELEASE IT.** *Employés free from the danger usually attending the use of chain brakes.*

☞ **Entirely Avoids Flat Wheels.**

THE LAUFMAN SCREW-BRAKE COMPANY
Box 2226. ST. PAUL, MINN.

AUDIBLE DANGER SIGNALS FOR RAILROADS.

THE

RAILWAY CAB ELECTRIC SIGNAL CO.

Equip Railroads with Block and Crossing Systems, Switch, Bridge, Culvert and Trestle Danger Signals.

Special Systems of Signals Designed for Termini and other Points. Also Furnish their Electric Automatic Gate Guard for Road and Street Crossings, Dispensing with the Services of Gatemen.

The signals are all given audibly on the Locomotive by the opening of a normally closed circuit, are thoroughly automatic in their operation, and signal danger when out of order from accident or malevolence. The signal, once given, sounds continuously until stopped by the engineer. **No Batteries are used on the Locomotive, nor on the line, nor any mechanism requiring to be wound or adjusted.** These signals give absolute safety under all conditions where carelessness and inattention to visual signals result in accident. Examination solicited and proofs of actual working given. Descriptive pamphlets sent.

General Offices, 40 and 42 Broadway, New York, U. S. A.

C. N. JORDAN, President. EDWARD FLASH, Vice-President. THOS. C. MILES, General Manager. ARNOLD LEO, Treasurer. E. S. BLACKWELL, Secretary. T. A. B. PUTNAM, Electrician. C. L. BRUNS, Mechanical Sup't.

Improved Wood-Working Machinery

FOR

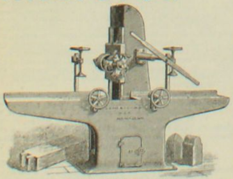
Railroad, Car and Bridge Shops, Government Arsenals and Navy Yards,

EMBRACING MACHINES FOR

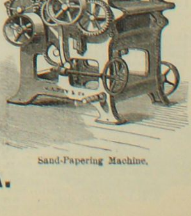
SILL AND TIMBER DRESSING,
PLANING, MATCHING AND BEADING,
MOLDING AND SHAPING,
MORTISING AND BORING
CAR GAINING,
CAR BORING, Etc., Etc.,

BAND AND SCROLL SAWING,
CIRCULAR AND BAND RESAWING,
SELF-FEEDING RIPPING & CROSS-CUTTING,
ROTARY CAR MORTISING AND BORING,
SAND PAPERING,
CAR TENONING, Etc., Etc.

Illustrations and Estimates furnished upon application to



Vertical End Tenoner.



Sand-Papering Machine.

W. H. DOANE, President.
D. L. LYON, Secretary.

J. A. FAY & CO., Cincinnati, Ohio, U. S. A.

W. H. Taylor, *Pres*..................Norfolk, Va.
Norfolk & Va. Beach R. R. 3 g. 18 m.
J. M. Dickey, *Gen. Man*..........Norfolk, Va
Norfolk & Western R. R. 5 g. 486 m. 82 lo. 1,779 c.
Jos. H. Sands, *Gen. Supt*........Roanoke, Va
S B. Haupt, *Supt. M. Power*.... Roanoke, Va.
East Div.: N. M Osborne, *Supt*.....Norfolk, Va.
West Div.: Frank Huger, *Supt*..Lynchburg, Va.
North-Eastern R. R. of Ga. 5 g. 72 m. 2 lo. 20 cars.
H. R. Bernard, *Supt*................Athens, Ga.
North-Eastern R. R. (S. C.) (*See Wil. & Wel.*
North Pacific Coast R. R. 3 g. 84 m. 12 lo. 320 cars.
Gen. Supt..........San Rafael, Cal.
W. F. Russell, *Pur Agt*....San Francisco, Cal.
E. L. Reese, *M. M*...............Saucelito, Cal.
North Shore Ry. 4-8½ g. 209 m. 21 lo. 564 c.
W. Wainwright, *Gen. Man*.....Montreal, Can.
A. Davis, *Supt. & Pur. Agt*.......Quebec, Can
Northern (N. H.), and Concord & Claremont Rys.
(*See Boston & Lowell.*)
Northern (N. J.) R. R. (*See N. Y., L. E. & W'n.*)
Northern Central Ry. (*See Penna. R. R.* (6) *Div.*)
North'n Pacific R. R. 4-8½ g. 2,646 m. 391 lo. 9,897 c.
T F. Oakes, *Gen. Man*..........St. Paul, Minn.
John H. Ames, *Gen. Pur. Agt*..St. Paul, Minn.
Geo. W. Cushing, *Supt. M. P., M. & R. S.* do.
J. C. Barber, *M. C. B*..........Brainerd, Minn.
(1) E'n Div.: J. T. Odell, *A. Gen. Man.* St. Paul, Minn.
1st Gr. Div.: M. C. Kimberly, *Supt.* Brainerd, Minn.
H. J. Small, *M. M*..........Brainerd, Minn.
M. C. B......Brainerd, Minn.
2d Gr. Div.: J. M. Graham, *Supt.* Jamestown, Dak.
C. C. Quinn, *M. M*..................Fargo, Dak.
A. Bardsley, *M. M*...............Mandan, Dak.
F. Greene, *A. Supt*...............Mandan, Dak.
3d Gr. Div.: S. R. Ainslie, *Supt*.. Glendive, Mont.
S. L. Bean, *M. M*.............Glendive, Mont.
C. W. Rossiter, *M. M*........Livingston, Mont.
(2) W'n Div.: J. M. Buckley, *Asst. Gen. Man.*
New Tacoma, W. T
W. T. Small, *A. S. Mach*.......Tacoma, W T.
4th Gr. Div.: F. W. Gilbert, *Supt.* Missoula, Mont.
F. P. Weymouth, *Supt*........Sprague, W. T.
Wm. Garlock, *M. M*..........Missoula, Mont
J. Evans, *M. M*..................Sprague, W. T.
5th Gr. Div.: Otis Sprague, *Supt*...Tacoma, W. T
Northern & North-W'n Rys. 4-8½ g. 378 m. 50 lo. 1,195 c.
James Webster, *Supt*..............Toronto, Can.
W. C. Schreber, *Pur. Agt*.......Allandale, Can
P. Clarke *M. M*......................Toronto Can.
Northern & Western Ry. 4-8½ g. 50 m
J. B. Snowball, *Man*............Chatham, N. B,
Nova Scotia Ry. 4-8½ g. 79 m. 9 lo. 268 c.
C. A. Scott, *Gen. Man*......New Glasgow, N. S.
M. F. Punch, *M. M*........New Glasgow, N. S.

O

Ogdensburg & Lake Champlain R. R.
4-8½ g. 130 m. 33 lo. 1,694 cars.
A. A. Gaddis, *Gen. Man*......Ogdensburg, N. Y
E. B. Burnham, *Pur. Agt*...Ogdensburg, N. Y.
Wm. A Short, *M. M*..............Malone, N. Y.
H. S. Leach, *Master Builder*. Ogdensburg, N. Y.
Ohio River R. R. 4-9 g. 9 lo. 350 cars.
C. L. Williams, *Asst. Supt.* Parkersburg, W. Va.
S. Litchworth, *M. M*.....Parkersburg, W. Va.
Ohio Southern R. R.:
W. H. Van Tassel, *Supt*.........Springfield, O.
John King, *M. M*..................Springfield, O.
Ohio & Mississippi Ry. 4-9 g. 616 m. 113 lo. 2,501 cars.
W. W. Peabody, *Pres. & Gen. Man.* Cincinnati, O.
G. E Atwood, *Pur. Agt*..........Cincinnati, C.
F. W. Stapf, *Gen. M. M*........ Vincennes, Ind.
Cin. Div.: C. B. Cole, *Supt*.........Seymour, Ind.
J. P. Coulter, *Gen. M. C. B*......Aurora, Ind.
E. E. Jenks, *A. Gen. For*......Seymour, Ind.
W. L. Hoffecker, *Ass't M. M* Vincennes, Ind.
A. N. Bradley, *M. C. P*.........Cochran, Ind
St. L. & Sp. Div.: C. M. Stanton, *Supt.* St. Louis, Mo.
J. W. Stokes, *M. M.* (Spring. Div.)..Pana, Ill.
Louisv. Div.: C. B. Cole, *Supt*...Louisville, Ky
Old Colony R. R. 4-8½ g. 470 m. 124 lo. 3,527 cars.
J. R. Kendrick, *Gen. Man*.........Boston, Mass.
R. W. Husted, *Pur. Agt*............Boston, Mass.
Jas. N. Lauder, *Supt. R. S*...... Boston, Mass.
Sam. Stevens, *S. Br. & Bld'gs*....Boston, Mass.
Main Li. Div.: J. H. French, *Supt*...Boston, Mass.
F. M. Twombly, *M. M*...........Boston, Mass.
Cape Cod Div.: C. H. Nye, *Supt*..Hyannis, Mass.
F. M. Twombly, *M. M*............Boston, Mass.
No. Div.: S. A. Webber, *Supt*....Fitchburg, Mass.
A. W. Twombly, *M. M*........Taunton, Mass.
Olympia & Chehalis Val. R. R. 3 g. 15 m.
Otis Sprague, *Supt*.............Olympia, W. T.
Oregon Ry. & Navigation Co
3 & 4-8½ g. 807 m. 72 lo. 1,611 cars.
C. H. Prescott, *V. P. & Gen. Man.* Portland, Ore.
F. T. Dodge, *Supt.* (Riv. Div.)....Portland, Ore.
H. S. Rowe, *Supt.* (Ry Div.).......Portland, Ore.
J. M. Drake, *Pur. Agt*........... Portland, Ore.
Goodall, Perkins & Co., *Supt.* (Ocean Div.)
San Francisco, Cal.
C. C. Hobart, *Gen. M. M*.......The Dalles, Ore
P. Carlsen, *Foreman*..........The Dalles, Ore.
Oregon & California R. R. 4-8½ g. 449 m. 43 lo. 626 c
R. Koehler, *Man*.................Portland, Ore
J. Brandt, *Gen. Supt*.............Portland, Ore.
W. T. Bodley, *Pur. Agt*...........Portland, Ore.
A. Brandt, *M. M*...................Portland, Ore
Ottumwa & Kirkville Ry. 4-8½ g. 13 m.
J. A. Kebler, *Supt*...............Ottumwa, Ia.
Owensboro & Nashville R. R. 5 g. 44 m. 3 lo. 70 c.
W. M. Newbold, *Supt*..........Owensboro, Ky.
J. T. Edwards, *M. M. & C. B*..Owensboro, Ky.
Oxford & Henderson R. R. 4-8½ g. 13 m. 2 lo. 11 c.
James A. White, *Gen. Supt*...Henderson, N. C.
James E. Lawrence, *M. M*...Henderson, N. C.

P

Pacific Coast Ry. 3 g. 64 m.
J. M. Fillmore, *Manager*. San Luis Obispo, Cal.
John Walch, *M. M. & C. B.* do.
Painesville & Youngstown Ry. 3 g. 65 m. 7 lo. 319 c.
R. K. Paige, *Rec. & Man*........Painesville, O.
J. A. Newcome, *Supt. R. S*......Painesville, O.
Panama R. R. 5 g. 48 m. 14 lo. 2,200 cars.
G. A Burt, *Gen. Supt*..... Aspinwall, U. S Col.
E. Z. Penfield, *Pur. Agt*.......New York, N. Y.
Jos. Beaumont, *M. M*.....Aspinwall, U. S. Col
Passumpsic R. R. 4-8½ g. 147 m. 28 lo. 1,101 cars.
E. Raymond, *Pres. & Pur. Agt*..Boston, Mass.
H. E. Folsom, *Supt*............Lyndonville, Vt.
L. L. Brigham, *M. M*......... Lyndonville, Vt.
L. F. Woodard, *M. C. B*.......Lyndonville, Vt.
Paw Paw and Toledo & South Haven R. Rds.
3 g. 20 m. 3 lo. 16 cars.
John Ihling, *Supt*..................Lawton, Mich.
Peach Bottom R. R. 3 g. 55 m. 6 lo. 52 cars.
B. B. Newton, *Supt. & Pur. Agt*...Oxford, Pa.
E. H. Williams, *M. C. B*................York, Pa.
W. P. Kirk, *M. M*.....................Oxford, Pa.
Pemigewasset Valley R. R. 4-8½ g. 21 m. 2 lo. 127c.
J. Thomas Vose, *Pres*........ Boston, Mass.
Pennsylvania Co.'s (5) Roads
4-9 g. 3,222 m. 920 lo. 32,809 cars.
Gen. Divs. (1), (2), (3), (4) and (5).
Wm. A. Baldwin, *Gen. Man*... Pittsburgh, Pa.
John Thomas, *Gen. Supt*.... Pittsburgh, Pa.
Wm. Mullins, *Gen. Pur. Agt*...Pittsburgh, Pa.
Joseph Wood, *Supt. M. P*.....Fort Wayne, Ind.
(1) Pittsburgh, Ft. Wayne & Chicago Ry.
4-9 g. 468 m. 288 lo. 8,023 cars.
E'n Div.: A. B. Starr, *Supt*.......Allegheny, Pa.
Geo. J. Parkin, *M. M*.........Allegheny, Pa.
D. M. Peppard, *M. M*........ Crestline, O.
W'n Div.: C. D. Law, *Supt*.....Ft. Wayne, Ind.
F. D. Casanave, *M. M*........Ft. Wayne, Ind.
A. H. Somers, *Gen. For. Shops*...Chicago, Ill.
(2) Ashtabula & Pittsburgh, and
(3) Erie & Pittsburg R. Rds. 221 m. 29 lo. 1,362 c.
John M. Kimball, *Supt*. Lawrence Junc., Pa.
J. A. Wood, *Gen. For. Shops*........Erie, Pa.
(4) Cleveland & Pittsb'g R. R. 225 m. 97 lo. 3,534 c.
R. F. Smith, *Asst. Man*...........Cleveland, O.
Philip Bruner, *Supt*.............Wellsville, O.
W. F. Beardsley, *Mast. of Mach*. Wellsville, O.
5) No-W'n Ohio Ry.: J. S. Morris, *Supt*...Toledo, O.
Pennsylvania R. R. Co.'s Roads. (7 Gen. Divs.)
4-9 g. 3,158 m. 1,459 loco. 66,816 cars.
Chas. E. Pugh, *Gen Man*......Philadelphia, Pa.
Enoch Lewis, *Pur. Agt*.......Philadelphia, Pa.
S. M. Provost, *Supt. Trans*...Philadelphia, Pa.
Theo. N. Ely, *Gen S. M. P*.........Altoona, Pa.
Pennsylvania R. R. Divs.
4-9 g. 1,213 m. 705 lo. 46,819 cars.
Robt. E. Pettit, *Gen Supt*........Altoona, Pa
Frank L. Sheppard, *Supt. M. P*..Altoona, Pa.
G. W. Strattan, *M. M*.............Altoona, Pa
Jno. P. Levan, *Gen. Fore*........Altoona, Pa
Phila. Div.: Tho. Gucker, *Supt.* Philadelphia, Pa.
H. D. Garrett, *M. M*....W. Philadelphia, Pa.
I. W. Van Houten, *Gen. For*....W. Phila., Pa.
Schuylkill Div.:
Jas. Reed, *Supt*........................Reading, Pa.
Mid. Div.: O. E. McClellan, *Supt.* Harrisburg, Pa.
E. L. Caum, *M. M*.............Harrisburg, Pa.
Samuel W. Myers, *Gen. For.* Harrisburg, Pa.
Altoona Div.: J. B. Hutchinson, *Supt.* Altoona, Pa.
Pitts. Div.: Robert Pitcairn, *Supt*..Pittsburgh, Pa.
D. O. Shaver, *M. M*............Pittsburgh, Pa.
J. G. Stewart, *Gen. For*.......Pittsburgh, Pa.
W. Pa. Div.: A. P. Kirtland, *Supt.* Blairsville, Pa.
Wm. B. Norris, *M. M*...........Blairsville, Pa.
M. H. Falls, *Gen. For*...........Blairsville, Pa
Fred. Div.: Wilson Brown, *Supt*........York, Pa
Tyrone Div.: S. S. Blair, *Supt*........Tyrone, Pa.
Lew. Div.: Wm. M. Phillips, *Supt.* Lewistown, Pa.
Bed. Div.: R. L. Holliday, *Supt*.....Bedford, Pa.
Monong. Div.: David M. Watt, *Supt.* Pittsburgh, Pa.
Wm. Lininger, *M. M*..............Ormsby, Pa.
(2) United R. Rs. of N. J. Divs. 471 m. 330 lo. 4,041 c.
F. Wolcott Jackson, *Gen. St.* Jersey City, N. J.
H. S. Hayward, *Supt. M. P*...Jersey City, N. J.
David H. Baker, *Gen. For*...Jersey City, N. J.
N. Y. Div.: Jos. A. Crawford, *Supt.* Jersey City, N. J.
L. A. Bosdevex, *M. M*.......Jersey City, N. J.
E. F. Bosdevex, *Gen. For*..Jersey City, N. J.
Belv. Div.: J. A. Anderson, *Supt.* Lambertv., N. J.
R. McDowell, *M. M*.......Lambertville, N. J.
Amboy Div.: W. N. Bannard, *Supt.* Camden, N. J.
Thos. Kerr, *M. M*...........So. Amboy, N. J.
P. S. Bogart, *Gen. For*......So. Amboy, N. J.
(2½) Camden & At. Rd.: 75 m. 18 l. 261 c.
A. G. Dayton, *Supt*............ Camden, N. J.
Rufus Hill, *M. M*...............Camden, N. J.
Samuel Wills, *M. C. B*..........Camden, N. J.
(3) West Jersey R. R. 4-9 g. 188 m. 27 lo. 294 cars.
A. G. Dayton, *Gen. Supt*.........Camden, N. J
W McAlister, *M. M*...............Camden, N. J.
C. C. Williams, *Gen. For*........Camden, N. J.
(4) Phila., Wilm. & Balt. R. R. 409 m. 128 lo. 1,882 c.
H. F. Kenney, *Gen. Supt*.....Philadelphia, Pa.
J. M. Wallis, *S. M. P*.........Philadelphia, Pa.
H. D. Gordon, *M. M*.........Wilmington, Del.
W. H. Lungren, *M. C. B*......Wilmington, Del.
Cen. Div.: L. K. Lodge, *Supt*......... Media, Pa.
Del. Div.: I. N. Mills, *Supt*..........Clayton, Del.
Md. Div.: H. H. Carter, *Supt*..Wilmington, Del.
5) Phila. & Erie R. R. Divs.: 437 m. 110 lo. 3,089 c.
R. Neilson, *Gen. Supt*.......Williamsport, Pa.
Edw. D. Nelson, *Supt. Mo. Po.* Williamsport, Pa.
E'n. Div.: E. B. Westfall, *Supt.* Williamsport, Pa.
Sun. H. & W. Div: A. Walter, *Supt.*; and
H. K. Stout, *M. M*..............Sunbury, Pa.
Mid. Div.: Tho. A. Roberts, *Supt*.....Renovo, Pa.
Wm. L. Holman, *M. M*..........Renovo, Pa.
West'n Div.: J. W. Reynolds, *Supt*.....Erie, Pa.
J. Gaskill, *M. M*..............................Erie, Pa,
6) Northern Central Ry. 4-9 g. 346 m. 152 lo. 6,610 c.
Robert Neilson, *Gen. Supt*... Williamsport, Pa.
Edw. D. Nelson, *Supt. M. P*..Williamsport, Pa.
A. W. Sumner, *Pur. Agt*.........Baltimore, Md.
J. M. Coale, *M. M*.................Baltimore, Md.
G. W. Demarest, *Gen. For*.. Baltimore, Md.
Susq. Div.: E. B. Westfall, *Supt.* Williamsport, Pa.
Sham. Div.: A. Walter, *Supt*.......Sunbury, Pa.
Elm. & Can. Divs.: S. Meade, *Supt*..Elmira, N. Y.
Jas. Strode, *M. M*..................Elmira, N. Y.
J. C. Dyott, *Gen. For*..............Elmira, N. Y.
Sodus Bay Div.: S. Mead, *Supt.* Sodus Point, N. Y.
Baltimore Div.: H. W. Kapp, *Supt.* Baltimore, Md.
(7) Balt. & Pot. & Alex. & Fred. 125 m. 30 lo. 360 c.
H. F. Kenny, *Gen. Supt*.......Philadelphia, Pa.
A. W. Sumner, *Pur. Agt*........Baltimore, Md.
J. M. Wallis, *Supt. Mo. Po*....Philadelphia, Pa.
H. D. Gordon, *M. M*...........Wilmington, Del.
J. Lescallett, *For. Mach. Shop*. Washington, D.C.
R. F. Downs, *For. Car Shop*..Washington. D.C.
Penn. Coal Co.'s R. R. 4-3 g. 67 m. 23 eng. 3,271 c.
J. B. Smith, *Gen. Supt*...........Dunmore, Pa
And. Crane, *M. M*.................Dunmore, Pa.
Geo. W. Simpson, *M. C. B*........Dunmore, Pa.
Pennsylvania, Slatington & New England R. R.
In progress. 4-8½ g. 18 m. 1 lo. 20 cars.
C. H. Stanton, *Supt*........... New York, N. Y.
Pennsylvania & Erie R. R.—Early Branch.
C. R. Early, *Gen. Supt*.......... Ridgeway, Pa.
Pensacola & Atlantic R. R. 5 g. 161 m. 9 lo. 67 cars.
E. O. Saltmarsh, *Gen. Supt*.... Pensacola, Fla.
W. D. Robb, *M. M*.............Pensacola, Fla.
Pensacola & Perdido R. R. 5 g. 10 m. 5 lo. 93 cars.
B. F. Simmons, *Pr. & Supt*.... Pensacola, Fla.
H. W. Simmons, *Pur. Agt*......Pensacola, Fla.
J. C. Schutte, *M. M*.............Pensacola, Fla.
People's Ry. 4-8½ g. 15 m. 2 lo. 14 cars.
W. D. Pollard, *Supt*..............Pottsville, Pa.
Peoria, Decatur & Evansville Ry.
4-8½ g. 254 m. 30 lo. 1,660 cars.
G. L. Bradbury, *Gen. Man*........ Peoria, Ill.
P. Reilly, *M. M*......................Mattoon, Ill.
Peoria & Farmington R. R. (*See Cen. Ia.*)
Peoria & Pekin Union Ry. 4-8½ g. 20 m. 12 lo. 106 c.
Thos. B. Burnett, *Gen. Supt. & P. A.* Peoria, Ill.
O. W. Bell, *Supt*............................Peoria, Ill.
R. F. Hurd, *M. M. & C. B*...........Peoria, Ill.
Perkiomen R. R. 4-8½ gauge 39 miles.
D. B. Clack, *Supt*......Perkiomen Junction, Pa.
H. Boyd, *Pur. Agt*..............Norristown, Pa.
Petersburg R. R. 4-8½ g. 64 m. 10 lo. 133 cars.
R. M. Sully, *Supt*..............Petersburg, Va.
Geo. F. Jones, *Pur. Agt*.......Petersburg, Va.
J. R. Woodard, *M. M*..........Petersburg, Va.
Phila., Wilmington & Balt. R. R. (*See Penna. R. R.*)
Peterborough & Hillsborough. (*See Northern, N. H.*)
Philadelphia, Newtown & N. Y. R. R. 4-8½ g. 23 m.
W. M. Geary, *Supt*.............Philadelphia, Pa.
Phila. & Atlantic City R. R. 4-8½ g. 54 m.
John E. Wootten, *Gen. Man*. Philadelphia, Pa.
W. Bertolet, *Supt*...............Philadelphia, Pa.
W. S. Wilson, *Pur. Agt*........Philadelphia, Pa.
Philadelphia & Erie R. R. (*See Penna. R. R.*; (5) *Div.*)
Philadelphia & Reading R. R.
4-8½ g. 1,588 m. 940 lo. 57,477 cars.
John E. Wootten, *Gen. Man*..Philadelphia, Pa.
W. S. Wilson, *Pur. Agt*......Philadelphia, Pa.
Geo. Eltz, *Supt. Trans*............ Reading, Pa.
L. B. Paxson, *Eng. of Mach*...... Reading, Pa.
No. Penn. & Bound Brook Div.:
I. A. Sweigard, *Supt*.........Philadelphia, Pa.
Mahanoy & Susquehanna Div.:
J. H. Olhausen, *Supt*............Palo Alto, Pa.
D. C. Reinhart, *Asst. Supt*. ...Catawissa, Pa.
A. A. Hesser, *Asst. Supt* Mahanoy Plane, Pa.
Schuylkill & Susquehanna Br.:
H. W. Tracy, *Supt*..........Pine Grove, Pa.
Reading & Columbia R. R.:
A. M. Wilson, *Supt*..............Columbia, Pa.
N. J. Central and N. J. Southern Divs.:
W. W. Stearns, *Supt*........ Elizabeth, N. J.
Lehigh & Susquehanna Div.:
G. W. Twining, *Supt*.....Mauch Chunk, Pa.
Pittsburgh, Bradford & Buffalo Ry. (*See Pitts. & West.*)
Pittsburgh, Chartiers & Youghiogheny R. R.
4-8¾ g. 19 m.
Geo. S. Griscom, *Gen. Man*.....Pittsburgh, Pa.
Pittsburgh, Cincinnati & St. Louis Ry. (5 Gen. Divs.)
4-9 g. 916 m. 239 lo. 7,133 cars.
James McCrea, *Manager*.........Columbus, O.
Wm. Mullins, *Pur. Agt*.......Pittsburgh, Pa.
Edward B. Wall, *Supt M. P*.......Columbus, O
Robt. Curtis, *M. M*...............Columbus, O.
(1) P., C. & St. L. Div.: E. B. Taylor, *Supt.* Pittsburgh, Pa.
C. B. Street, *M. M*...............Dennison, O.
J. M. Copeland, *G. F. Car Shops*. Steubenville, O.
2) C. & M. V. Div.: W. F. Black *Supt*..Zanesville, O.
Leroy Kells, *M. M*..............Lancaster, O.
Wm. Meikle, *Gen. For*.......... Lancaster, O.
Daniel Jewell, *Gen. F. Car Shops*. Lancaster, O.
(3) Li. Mi. Div.: Ralph Peters, *Supt*....Cincinnati, O.
Leroy Kells, *M. M*...............Cincinnati, O.
Jos. Underwood, *G. F. Car Shops*. Cincinnati, O.
(4) J. M. & I. R. R.: E. W. McKenna, *Supt.* Louisville, Ky.
Wm. Swanston, *M. M*.....Indianapolis, Ind.
Edw. Austin, *G. F. C. Shops*..Indianapolis, Ind.
(5) Indianapolis & Vincennes R. R.
J. J. Turner, *Supt*.........Indianapolis, Ind.
Pittsburgh, Cleveland & Toledo R. R.
4-8¾ g. 78 m. 18 lo. 525 cars.
C. H. Andrews, *Pres*............Youngstown, O.
W. F. Hofecker, *M. M*.........Youngstown, O.
Pittsburgh, Ft. Wayne & Chicago Ry. (*See Penna. Co.*)
Pittsburgh Southern Ry. (*See Balt. & O.*)
Pitts. & Castle Shannon R. R. 3-4 g. 9 m. 5 lo. 428 c.
Gen. Supt.... Pittsburgh, Pa.
Holmes Ward, *M. M*......Castle Shannon, Pa.
Wm. E. Long, *M. C. B*........ Pittsburgh, Pa.
Pitts. & Lake Erie R. R. 4-8¾ g. 70 m. 30 lo. 1,528 c.
W. C. Quincy, *Gen. Man*........Pittsburgh, Pa.
D. H. Hostetter *Pur. Agt*..... Pittsburgh, Pa.
R. W. Jones, *Mast. Trans*......Pittsburgh, Pa.
S. W. Haines, *M. M*..............Pittsburgh, Pa.
Pittsburgh, McKeesport & Youghiogheny.
4-8¾ g. 57 m. 19 lo. 278 cars.
W. C. Quincy, *Gen. Man*...... Pittsburgh, Pa.
R. W. Jones, *M. of Trans*......Pittsburgh, Pa.
S. W. Haines, *M. M*........... Pittsburgh, Pa.
Pitts. & Western R. R. 3 & 4-8½ g. 274 m. 50 lo. 1,407 c.
Pitts., Bradford & Buff. Ry. 3 g. 93 m. 8 lo. 163 c.
Tho. M. King, *Gen. Man*.........Allegheny Pa.
J. T. Johnson, *Supt*.............Allegheny, Pa.
J. Morton Hall, *Pur. Agt*.......Allegheny, Pa.
W. M. Flahavhan, *M. M*.........Allegheny, Pa
Pontiac, Oxford & Pt. Austin R. R. 100 m.
Geo. W. Debevoise, *Pr. & Gen. Man.* N. York, N. Y.
Jas. Houston, *Gen. Supt*.........Pontiac, Mich.
Port Huron & No.-Western Ry. 3 g. 218 m. 14 lo. 288 c.
H. McMorran, *G. Man. & P. A.* Port Huron, Mich.
I. R. Wadsworth, *Supt*.....Port Huron, Mich.
Chas. Diefenbach, *M. M*.....Port Huron, Mich.
Benj. Hillier, *M. C. B*........Port Huron, Mich.
Port Jervis & Monticello R. R. 4-8½ g. 24 m. 3 lo. 13 c.
J. M. Warner, *Gen. Man*.....Port Jervis, N. Y.
Port Royal & Augusta. 5 g. 180 m. 16 lo. 310c
and Augusta & Knoxville Rys.
J. N. Bass, *Supt*..................Augusta, Ga.
T. F. Warwick, *M. M. & M. C. B.* Augusta, Ga.
Portland & Ogdensburg. 4-8½ g. 110 m. 11 lo. 311 c.
J. Hamilton, *Gen. Supt. & P. A*..Portland, Me.
M. M.............Portland, Me.
W. G. Brewer, *M. C. B*.........Portland, Me.
Portland & Rochester R. R. 4-8½ g. 52 m. 8 lo. 226 c.
J. W. Peters, *Supt. & Pur Agt*...Portland, Me.
E. H. C. Tompson, *For. of Mach*..Portland, Me.
David Dow, *For. of Car Repairs*. Portland, Me
Potomac, Fred.'g & Pied. R. R 3 g. 38 m. 2 lo. 38 c.
W. H. Richards, *Gen. Man*. Fredericksburg, Va.
W. J. Sweigard, *M. M*....Fredericksburg, Va.
Pough., Hart. & Bos. R. R. 4-8½ g. 45 m. 4 lo. 65 c.
J. A. Perkins, *Supt*........Poughkeepsie, N. Y.
John L. Donaldson, *M. M*. Poughkeepsie, N. Y.
Pratt Coal & Iron Company's R. R. 5 g. 20 m. 4 lo. 184 c.
W. L. Gude, *Gen. Man*........Pratt Mines, Ala.
Prescott & Thirty-Fifth Parallel R. R.
4-8½ g. 77 miles in progress.
Samuel A. Henszey, *Gen. Man*..Prescott, Ariz.
Prince Edward Island Ry. 3-6 g. 220 m. 21 lo. 350 c.
Jas. Coleman, *Supt. & Pur. Agt.*;
Jos. Unsworth, *M. Supt. & Storekeeper*; and
D. M. Fraser, *M. C. B*...Charlottetown, P. E. I.
Profile & Franconia Notch R. R. 3 g. 15 m. 3 lo. 18 c.
Emmons Raymond, *Pur. Agt*... Boston, Mass.
C. H. Greenleaf, *Supt*......Profile House, N. H.
Prospect Park & Coney Island R. R.
4-8½ g. 15 m. 8 lo. 123 cars.
And. R Culver, *Pres*.........Brooklyn, N. Y.
R. Schermerhorn, *Supt*........Brooklyn, N. Y.
Martin Painter, *M. M*...........Brooklyn, N. Y.
Prov., Warren & Bristol R. R. 4-8½ g. 19 m. 6 lo. 79 c.
Waterman Stone, *Supt*........Providence, R. I.
Rufus Smith, *M. M. & C. B*........Bristol, R. I.
Prov. & Springfield R. R. 4-8½ g. 23 m. 4 lo. 92 c.
Wm. Tinkham, *Gen. Man*.....Providence, R. I
G. T. Richardson, *M. M*........Providence, R. I.
Prov. & Worcester. 4-8½ g. 50 m. 37 lo. 1,253 c.
W. E. Chamberlain, *Supt*.....Providence, R. I.
A. Griggs, *Supt. L. & C. D*....Providence, R. I.
Pullman's Palace Car Co. 1,100 passenger cars.
Geo. M. Pullman, *Pres*...........Chicago, Ill.
H. Porter, *V. Pres*............New York, N. Y.
Geo. F. Brown, *Gen. Man*.........Chicago, Ill
Wm. A. Angell, *Pur. Agt*...........Chicago, Ill.
S. W. Bretzfield, *Asst. Pur. Agt*. New York, N. Y.
A. Rapp, *Man.* (Chicago Works)...Chicago, Ill.
H. L. Spaulding, *Man.* (Det. Shops). Detroit, Mich.
E. A. Benson, *Supt. Shops*...... St. Louis, Mo.

Q

Quebec Central Ry. 4-8½ g. 156 m. 10 lo. 267 cars.
J. R. Woodward, *Gen. Man*..Sherbrooke, P. Q.
A. Steele, *Supt*................ Sherbrooke, Que.
R. D. Morkill, Jr., *Pur. Agt*..Sherbrooke, P. Q.
Jas. Seiveright, *M. M*.......Sherbrooke, P. Q.
Quebec, Montreal, Ottawa & Occidental Ry.
4-8½ g. 354 m. 36 lo. 993 cars.
L. A. Senecal, *Gen. Supt*........Quebec, Can.
Quebec & Lake St. John Ry. 4-8½ g. 36 m. 3 lo. 55 c.
J. G. Scott, *Manager*..............Quebec, Can.
Frank Fournier, *Supt*......St. Raymond, P. Q.
John T. Eames, *M. M*.......St. Raymond, P. Q.

R

Raleigh & Augusta Air-Line; Carolina Central Raleigh & Gaston R. Rs. 4-8½ g. 446 m. 52 lo. 1,052 c
John C. Winder, *Gen. Man. & P. A.* Raleigh, N. C.
Raleigh Rds. 4-8½ g. 200 m. 27 lo. 638 cars.
B. R. Harding, *Supt. of Mach.* Raleigh, N. C.
Carolina Cen. R. R. 4-8½ g. 242 m. 26 lo. 431 c.
L. C. Jones, *Supt*.........Wilmington, N. C.
James Maglenn, *M. of Mach.* Laurinburg, N. C.
S. R. Ethridge, *M. C. B*...Laurinburg, N. C.
Rhinebeck & Connecticut. (*See Hart. & Ct. Wn.*)
Richmond, Fredericksburg & Potomac R. R.
4-9 g. 81 m. 15 lo. 149 cars.
E. T. D. Myers, *Gen. Supt*.. Richmond, Va.
T. L. Courtney, *Asst. Supt*..Richmond, Va.
H. Kuhn, *M. M*................Richmond, Va.
W. H. Trainham, *M. C. B*....Richmond, Va.
Rich., York River & Ches. R. R. (*See Rich. & Dan.*)
Richmond & Alleghany R. R. 4-9 g. 261 m. 19 lo. 837c.
Decatur Axtell, *Rec. & Gen. Man.* Richmond, Va.
M. Sweeney, *Pur. Agt*...........Richmond, Va
Geo. D. Harris, *M. M. & C. B*...Richmond, Va.
Richmond & Danville R. R. Co.'s Roads.
1,736 miles 218 loco. 3,833 cars.
E. B. Thomas, *2d V. P. & G. Man.* Richmond, Va.
Peyton Randolph, *As. G. Man*..Richmond, Va.
J. P. Minetree, *Pur. Agt*........ Richmond, Va.
R. D. Wade, *Supt. Mo. Po*.......Richmond, Va.
(1) Rich. & Dan. R. R. 5 g. 847 m. 131 lo. 2,687 cars.
Rich. & Dan. Div.: 5 g. 320 m. 80 lo. 1,797 c
Wm. H. Green, *Supt*.........Richmond, Va.
M M.........Richmond, Va.
J. B. Vaughan, *For. Car Sh*...Richmond, Va.
North Carolina Div. 5 g. 223 m. 22 lo. 268 cars.
A. B. Andrews, *Supt*..........Raleigh, N. C.
W. H. Turrentine, *M. M.* Comp'y's Shops, N. C.
J C. Holt, *For. Car Sh.* Comp'y's Shop N. C.
Atlanta & Char. Air Line. 5 g. 280m. 31 lo. 415 c.
Narrow-Gauge Branches. 3 g. 80 m. 5 lo. 41 c.
Edmund Berkley, *Supt*.........Atlanta, Ga.
T. W. Gentry, *M. M*.............Atlanta, Ga.
Z. T. Smith, *For. Car Sh*......... Atlanta, Ga.
(2 Charlotte, Col. & Aug. R. R. 5g. 239 m. 22 lo. 287 c.
G. R. Talcott, *Supt*............Columbia, S. C.
J. H. Green, *M. M.* (2 roads)...Columbia, S. C.
3) Columbia & Greenville R. R. 5 g. 297 m. 22 l. 224 c.
G. S. Talcott, *Supt*............Columbia, S. C.
J. O. Meredith, *For. E. & C. Rep*. do.
(4) Virginia Midland Ry. 4-8½ g. 353 m. 41 lo. 631 c.
Supt. Alexandria, Va.
H. M. Smith, *M. of M*.......Alexandria, Va.
J. T Nalls, *M. C. B*.........Alexandria, Va.
Richmond & Petersburg R. R. 4-8½ g. 25 m. 8 lo. 132 c.
J. R. Kenly, *Supt*..................Richmond, Va
John O'Brien, *M. M*..............Richmond, Va
Rio Grande R. R. 3-6 g. 22 m. 3 lo. 40 cars
M. J. Gomila, *Rec. & Gen. Man.* Brownsville, Tex
G. W. Rendall, *M. M*..........Brownsville, Tex.
M. Markwood, *M. C. B*.......Brownsville, Tex.
Rio Grande & Pecos Ry. 4-8½ g. 27 m. In progress.
W. W. Hungerford, *Man*..........Laredo, Tex.
Rochester & Lake Ontario Ry. 4-8½ g. 6 m. 2 lo. 10 c.
N. B. Ellison, *Man*.............Rochester, N. Y..
Rochester & Pittsb'g. R. R. 4-8½ g. 260 m. 60 lo. 3,296 c.
Geo. E. Merchant, *Gen. Man*...Rochester N. Y.
J. T. Gardiner, *Gen. Supt*........Buffalo, N. Y.
C. W. Mills, *Supt. M. P*.......Rochester, N. Y
Rock Island & Mercer County R. R., and
Rock I'd & Peoria Ry. 4-8½ g. 113 m. 13 lo. 357 c.
R. R. Cable, *V.-P. & Gen. Supt*.....Chicago, Ill
R. I. & P. Ry.:
H. B. Sudlow, *Supt. & P. A*....Rock Island, Ill.
Joseph Elder, *M. M*.................Peoria, Ill.
R. I. & M. C. Rd.: H. B. Sudlow, *Supt.* R'k Island, Ill.
J. H. Parks, *M. M*..............Rock Island, Ill.
Rogersville & Jefferson R. R. 5 g. 16 m. 1 lo. 6 cars.
C. M. Leuty, *Supt*............ Rogersville, Tenn.
Rome (Ga.) R. R. 5 g. 20 m. 2 lo. 17 cars
Eben Hillyer, *Pres. & Supt*........ Rome, Ga.
O. W. Harbin, *M. M*............... Rome, Ga.
Rome, Watertown & Ogdensburg R. R.
4-8½ g. 418 m. 61 lo. 1,831 cars.
H. M. Britton, *Gen. Man. & P. A.* Oswego, N. Y.
Geo. H. Haselton, *S. M. P. & M*..Oswego, N. Y.
E'n Div.: J. D. Remington, *A. Supt.* Watertown, N. Y.
W'n Div.: W. H. Chauncey, *A. Supt.* Oswego, N. Y
Roodhouse & Scottsville Ry. In progress.
Geo. P. Merrill, *Gen. Man*..........Chicago, Ill.
Rumford Falls & Buckfield R. R. 4-8½ g. 29 m. 2 l. 62 c.
L. L. Lincoln, *Supt. & Pur. Agt*...Canton, Me.

S

Sabine & East Texas Ry. (*See Cen. Pac.*)
Sacramento & Placerville R. R. (*See Cen. Pac.*)
Saginaw Bay & Northw'n R. R. 4-8½ g. 31 m. 6 lo. 136 c.
J. Jackson, *Gen. Man*.......Pinconning, Mich.
F. T. Lillote, *Act. Pur. Agt*...Pinconning, Mich.
Edward Keeler, *M. M*........Pinconning, Mich.
Saginaw, Tuscola & Huron R. R.
3 g. 50 m. 5 lo. 85 cars.
M. B. Wilkinson, *Gen. Supt*..E. Saginaw, Mich.
Saginaw Valley & St. Louis R. R. 4-8½ g. 39 m. 4 l. 64 c
T. M. Fish, *Gen. Supt*..............Ionia, Mich.
N. W. Merrill, *Div. Supt*........Saginaw, Mich.
Allan Bourn, *Pur. Agt*...........Detroit, Mich.
Geo. C. Watrous, *M. M*.............Ionia, Mich
Salt Lake & Western R. R. (*See Un. Pac.*; (6) *Div.*)
San Francisco & No. Pac. 4-8½ g. 139 m. 11 lo. 245 c.
Arthur Hughes, *Gen. Man*..San Francisco, Cal.
H. C. Whiting, *Supt*...........San Rafael, Cal.
Ed. Reynolds, *Gen. M. M*.........Donahue, Cal.
Ed. Reynolds, *M. C. B*.......... Donahue, Cal.
Sanborn, Cooperstown & Turtle M. R. R. In progress.
C. A. Roberts, *Gen. Man*...... Sanborn, Dak.
Sandy River R. R. 2 g. 18 m. 3 lo. 36 cars.
N. B. Beal, *Pres. & Supt*..........Phillips, Me.
M. Saunders, *M. M. & C. B*........Phillips, Me.
Sandusky, Mansfield & Newark R. R. (*See B. & O.*)
Sanford & Indian River R. R. (*See So. Flor.*)
San Luis Obispo & Santa Maria R. R.
3 g. 20 m. 2 lo. 30 cars.
Charles Goodall, *Man*......San Francisco, Cal.
San Pete Valley R. R. 3 g. 33 m. 2 lo. 57 cars.
S. Bamberger, *Man*..... Salt Lake City, U. T.
J. E. Bamberger, *Pur. Agt*.... Salt Lake, U. T.
B. Bates, *M. M*.......................Morvin, U. T.
Saratoga, Mt. McGregor & Lake George R. R.
3 g. 11 m. 3 lo. 12 cars.
John McGee, *Supt*. ....Saratoga Springs, N. Y.
Savannah, Florida & W'n Ry. 5 g. 519 m. 62 lo. 1,063 c.
H. S. Haines, *Gen. Man*.........Savannah, Ga.
R. G. Fleming, *Supt*.................Savannah, Ga.
A. A. Aveilhé, *Pur. Agt*..........Savannah, Ga
G. M. D. Riley, *M. of Mach*.......Savannah, Ga.
E. Geffcken, *For. Car Dept*.....Savannah, Ga.
Sav., Griffin & No. Ala. R. R. *Op. by Central (Ga.)*.
Schuylkill & Lehigh R. R. (*See Phil & Read.*)
Scoharie Valley R. R. (*See Middleburg & Sch.*
Scioto Valley R. R. 4-8¾ g 132 m. 19 lo. 548 cars
Geo. Skinner, *Supt. & P. Agt*.....Columbus, O.
R. Bromley, *M. M*..............Portsmouth, O
Seaboard & Roanoke R. R. 4-8½ g. 80 m. 21 lo. 384 c.
L. T. Myers, *Supt*..............Portsmouth, Va.
J. A. Walton, *Pur. Agt*........Portsmouth, Va.
M. M. Pendleton, *S. M. P. & M.* Portsmouth, Va.
Sedalia, Warsaw & Southern Ry. (*See Mo. Pac.*)
Sharpsville R. R. 4-8½ g. 23 m. 3 lo. 13 cars.
Thos. M. King, *V. P. & Gen. Man.* Pittsburgh, Pa.
W. C. Agnew, *Asst. Gen. Man*..Youngstown, O.
Shelby Iron Co. R. R. {5-9 g. 7 m. 2 lo. / 3-6 g. 12 m. 3 lo.} 50 c.
J. A. McArthur, *G. Man*..Shelby Ir. Wks, Ala.
R. H. Stoughton, *Supt*..Shelby Iron Wks., Ala.
J. H. Burghardt, *M. M*..Shelby Iron Wks, Ala.
Shell Beach R. R. 5 g. 22 m.
M. R Spelman, *Supt*.........New Orleans, La.
Shenandoah Valley R. R. 4-9 g. 249 m. 32 lo. 849 c.
D. W. Flickwir, *Gen. Supt*........Roanoke, Va.
W. C. De Armond, *Pur. Agt*. ..Philadelphia, Pa.
Supt. of M. P...Roanoke, Va.
W. A. Morgan, *M. C. B*..........Lynchburg, Va.
J. T. Robinett, *M. M*........ Petersburg, Va.
Shenango & Allegheny R. R 4-8½ g. 74 m. 8 lo. 248 c.
J. T. Blair, *G. Man. & Pur. Agt.* Greenville, Pa.
Edw. Richardson, *M. M. & C. B.* Greenville, Pa.
Shepaug R. R. 4-8½ g. 38 m. 3 lo. 28 cars.
Edwin McNeill, *Supt*.............Litchfield, Ct.
A. J. Broughet, *M. M*........... Litchfield, Ct.
Ship Is., Ripley & Ky. R. R. 3 g. 25 m. 2 lo. 23 cars.
C. L. Harris, *Supt. & Pur. Agt*....Ripley, Miss
W. H. Phelps, *M. M*...................Ripley, Miss.
Silver City, Deming & Pacific R. R. 3 g. 47 m. 3 l. 141 c.
John W. Smith, *Gen. Supt*....Silver City, N. M.
Silver Lake Ry 4-8½ g. 6 m. 1 lo. 4 cars
C. W. S. Nobles, *Supt*...............Perry, N. Y.
Sinaloa & Durango R. R. 4-8½ g. 39 m. 2 lo. 40 cars.
Geo. S. Skilton, *Gen. S.* Culiacan, Sinaloa, Mex.
John E. Bell, *M. M*..................Culiacan, Mex.
Skaneateles R. R. 4-8½ g. 5 m. 2 lo. 5 cars.
J. McNamara, *Supt*..........Skaneateles, N. Y.
Sioux City & Pacific R. R. 4-8½ g. 427 m. 31 lo. 893 c.
W. P. Linsley, *Gen. Man*..... Missouri Valley, Ia.
C. M. Lawler, *Gen. Supt*....Missouri Valley, Ia.
R. W. Hamer, *Pur. Agt*.............Chicago, Ill.
W. G. Brownson, *Asst. Supt*.....Norfolk, Neb.
S. A. Teal, *M. M*...........Missouri Valley, Ia.
W. H. Ramseyer, *M. C. B*...Missouri Valley, Ia.
Smyrna & Delaware Bay R. R. (*See Kent County.*
Sodus Bay Ry. (*See Northern Central.*
Somerset R. R. 4-8½ g. 25 m. 3 lo. 24 cars.
W. M. Ayer, *Supt & Pur. Agt*......Oakland, Me.
S. P. Mosher, *For. Car Rep*.....Oakland, Me.
C. Crowell, *For. Lo. Rep's*.....No. Anson, Me.
Sonora Ry. (*See A., T. & S. Fe.*)
Sonoma Valley:
Arthur Hughes, *Gen. Man*. San Francisco, Cal.
H. C. Whiting, *Supt*..........San Rafael, Cal.
J. T. Peters, *Asst. Supt*........Glen Ellen, Cal.
Ed Reynolds, *M. M*............ Donahue, Cal
South & North Alabama R. R. (*See Louis. & Nash.*)
South Carolina Ry. 5 g. 246 m. 46 lo. 834 cars.
John B. Peck, *Gen. Man*........Charleston, S. C.
S. B. Pickens, *Pur. Agt*.........Charleston, S. C.
P. J. Cochrane, *Mast. of Mach*. Charleston, S. C.
Geo. H. Gramling, *M. C. B*....Charleston, S. C
South-Eastern Ry. 4-8½ g. 280 m. 30 lo. 1,000 cars.
T. A. McKinnon, *Gen. Man*.....Montreal, Can.
Robt. McLoud, *M. M*...........Farnham, P. Q.
South Florida R. R. 3 gauge 115 m. 13 lo. 250 cars.
B. R. Swoope, *Supt. & P. A*....... Sanford, Fla.
R. Derby, *M. M*.......................Sanford, Fla.
A. D. Stentiford, *M. C. B*...........Sanford, Fla.
South Mountain R. R. 4-8½ g. 18 m. 4 lo. 22 c.
W. H. Woodward, *Supt.* Pine G've Furnace, Pa.
South Pacific Coast R. R. 3 g. 81 m. 16 lo. 500 cars.
L. Fillmore, *Gen Supt*.....San Francisco, Cal
W. H. Masterman, *M. M. & C. B.* Newark, Cal
South-Western R. R. (Ga.) (*See Central of Ga.*)
South-Western Ry. (Ky.) 4-8½ g. 5 m. 1 lo. 28 cars.
M. Tabler, *Supt. & Man*.......Harrodsburg, Ky.
J. C. Hool, *Pur. Agt*...........Harrodsburg, Ky.
Southern Central R. R. 4-8½ g. 156 m. 21 lo. 407 c.
H. D. Titus, *Gen. Supt. & P. A*.....Auburn, N. Y
John White, *M. M*...................Auburn, N. Y.
H. Mooney, *M. C. B*...................Auburn, N. Y.
Southern Kansas Ry. (*See At., Top. & Santa Fe.*)
Southern Maryland R. R. 4-8½ g. 20 m. 1 lo. 20 c.

J. B. Ridgway, *Supt*. ....Brandywine, Md.
C. R. Joyce, *M. M*. ....Brandywine, Md
Southern Pacific R. R. 4–8½ g. 203 m. 335 lo. 780 c
Northern Div. (*For other Divs. see Cen. Pac.*)
A. C. Bassett, *Supt*. ......San Francisco, Cal.
J. R. Watson, *Pur. Agt*. ....Sacramento, Cal.
J. T. Wilson, *M. M*. ......San Francisco, Cal.
F. N. Bellisle, *M. C. B*. ...San Francisco, Cal.
Southern Pacific R. R. of Arizona. (*See Cen. Pac.*)
Southern Pacific R. R. of New Mexico. (*See Cen. Pac.*)
Spartanburg, Union & Columbia R. R.
(*See Rich. & Dan.; (3) Div.*)
Spring Brook R. R. 4-3 g. 8 m. 1 lo. 18 cars.
Charles Pugh, *Pres*. ....Pittston, Pa.
Spring Hill & Parrsboro Ry. (*See Cumberland.*)
Springfield, Effingham & So.-E'n Ry. (*See Ind. & Ill.*)
Springville & Sardinia Ry. 4-8½ g. 12 m. 1 lo. 8 c.
Bertrand Chaffee, *Pres*. ......Springville, N. Y.
St. Croix & Penobscot R. R. 4–8½ g. 22 m. 4 lo. 195 c.
S. W. Haycock, *Supt. & Pur. Agt*. .Calais, Me.
G. H. Corsen, *M. M*. ....Milltown, Me
H. C. Tincker, *M. C. B*. ....Milltown, Me.
St. Helen, Houghton Lake & West. R. R. 4–8½ g. 13 m.
Z. C. Jessop, *Gen. Man*. ....Detroit, Mich
St. John & Maine Ry. (*See New Brunswick.*)
St. John's Ry. 4–8½ g. 14½ m. 2 lo. 24 cars.
R. McLaughlin, *Pr. & Supt*. .Jacksonville, Fla.
J. M. Owens, *M. of Mach*. ...St. Augustine, Fla.
St. John's & Lake Eustis Ry. (*See Florida Southern.*)
St. Johnsb'ry & Lake Champ. 4–8½ g. 120 m 15 lo. 372 c
A. B. Jewett, *Supt. & P. A*. .St. Johnsbury, Vt
Geo. E. Howe, *M. M. & C. B*. St. Johnsbury, Vt
St. Joseph Valley R. R. 3 g. 15 m. 1 lo. 11 cars
B. Helmick, *Gen. Man*. ....Buchanan, Mich
St. Joseph & Des Loge Ry. 3 g. 13 m. 4 lo. 70 cars.
T. T. Onderdonk, *Supt*. ......Bonne Terre, Mo
E. B. Keyes, *M. C. B*. ....Bonne Terre, Mo
St. Joseph & Western R. R.
4-8½ g. 252 m. 21 lo. 175 cars.
D. McCool, *Gen. Man*. ....St. Joseph, Mo.
E. Sleepy, *M. M. & C. B*. ....St. Joseph, Mo.
St. Joseph & Des Moines R. R. (*See K. C., St. J. & C. B.*)
St. Lawrence & Ottawa Ry. (*See Can. Pac.*)
St. Louis, Alton & Terre Haute R. R.
Main Line. (*See C., C., C. & I.; Ind. & St. L. Div.*
St. Louis & Cairo Div.: 4–8½ g 137 m. 19 lo. 800 c
G. W. Parker, *Gen. Man*. ....E. St. Louis, Ill.
J. L. Hinckley, *Supt*. ....Belleville, Ill.
P. H. Murphy, *M. M*. ....E. St. Louis, Ill.
St. Louis Bridge Co. and Tunnel R. R.
4–8½ g. 31 m. 22 lo. 11 cars.
Wm. Taussig, *Gen. Man*. ....St. Louis, Mo
A. W. Dickinson, *Supt*. ....St. Louis, Mo.
J. E. Williams, Jr., *Pur. Agt*. ....St. Louis, Mo
Geo. W. Walshe, *M. M*. ....St. Louis, Mo.
St. Louis, C. Cœur & St. Ch. Ry. 3 g. 16 m.
F. M. Colburn, *Gen. Man*. ....St. Louis, Mo.
St. Louis Coal R. R. 4–8½ g. 93 m. 10 lo. 217 cars.
Robt. Meek, *Supt*. ....Carbondale, Ill.
Jas. C. Bryden, *Pur. Agt*. ......St. Louis, Mo.
St. Louis, Des Moines & Northern Ry. 4–8½ g. 43 m.
C. F. Merk, *Supt*. ....Des Moines, Ia.
St. L., Ft. Scott & Wichita R. R. 4–8½ g. 214 m. 6 l. 337 c.
J. W. Miller, *V. P. & Gen. Man*. .Fort Scott, Kan.
Tho. N. Lewis, *Asst. Supt*. ......Fort Scott, Kan.
Henry Berger, *M. M*. ....Ft. Scott, Kan.
St. L., Hannibal & Keokuk. 4–8½ g. 85 m. 5 lo. 70 c.
E. C. Case, *Rec. & Man*. ....Hannibal, Mo.
E. W. Hoisington, *M. M*. ....Hannibal, Mo.
St. Louis, Iron Mt. & So'n Ry. (*See Mo. Pac.; (4) Div.*)
St. L., Keokuk & No.-W'n. Ry. (*See C., B. & Q.*)
St. L., Salem & Little Rock. 4–9 g. 72 m. 5 lo. 111 c.
H. A. Crawford, *V. Pr. & P. A*. ..St. Louis, Mo.
E. B. Sankey, *Supt*. ....Salem, Mo.
Thomas Everson, *M. M*. ....Steelville, Mo
J. W. Houston, *M. C. B*. ....Steelville, Mo.
St. Louis & Cairo R. R. 3 g. 152 m. 22 lo. 896 cars.
Chas. Hamilton, *Gen. Supt*. ......St. Louis, Mo.
E. J. Newell, *M. M*. ....E. St. Louis, Mo.
St. L. & San Fran. Ry. 4–8½ g. 943 m. 103 lo. 3,737 c.
C. W. Rogers, *V. P. & Gen. Man*. .St. Louis, Mo.
D. H. Nichols, *Supt. Tran*. .No. Springfield, Mo.
A. P. Mann, Jr., *Pur. Agt*. ....St. Louis, Mo.
M. Kearney, *M. M. & C. B*. .No. Springfield, Mo.
East Div.: A. Veech, *Supt*. ....St. Louis, Mo.
Central Div.: W. A. Thoms, *Supt*. .Springfield, Mo.
Kan. Div.: J. R. Wentworth, *Supt*. Neodesha, Kan.
St. Martin's & Upham Ry. 4–8½ g. 30 m. 2 lo. 8 cars.
A. E. Killam, *Manager* ....St. Martin's, N. B.
St. Paul Eastern Grand Trunk Ry. 4–8½ g. 15 m.
D. C. Lamb, *Gen. Supt*. ....Oconto, Wis.
St. Paul, Minneapolis & Manitoba Ry.
4–8½ g. 1,402 m. 201 lo. 5,068 cars.
A. Manvel, *Gen. Man*. ....St. Paul, Minn.
H. C. Ives, *Asst. Gen. Man*. ....St. Paul, Minn.
E. B. Wakeman, *Asst. Gen. Supt*. St. Paul, Minn.
J. C. Morrison, *Pur. Agt*. ....St. Paul, Minn.
Thos. Downing, *M. M. & C. B*. ..St. Paul, Minn.
Breck. Div.: W. S. Kemp, *Supt*. ..St. Paul, Minn.
F. F. Div.: J. B. Rice, *Supt*. ....St. Paul, Minn.
No'n Div.: A. Guthrie, *Supt*. .....Crookston, Minn.
St. Paul & Duluth R. R. 4–8½ g. 225 m. 37 lo. 1,080 c.
W. H. Fisher, *Gen. Supt*. ....St. Paul, Minn.
J. G. Callahan, *Pur. Agt*. ....St. Paul, Minn.
Chas. F. Ward, *M. M. & M. C. B*. ..St. Paul, Minn.
State Line & Sullivan R. R. 8½ g. 25 m. 3 lo. 263 c.
I. O. Blight, *Supt*. ....Towanda, Pa.
Staten Island R. R. ¼ g. 13 m. 4 lo. 18 c
J. W. Wilbur, *Supt*. ....New York, N. Y
Stony Clove & Catskill Mountain R. R.
3 g. 14 m. 2 lo. 22 cars.
Geo. Coykendall, *Gen. Supt*. ....Rondout, N. Y
Stony Creek R. R. 4-8½ g. 103 m.
Geo. B. Boggs, *Supt*. ....Norristown, Pa.
Sterling Mountain Ry. 6 g. 8 m. 2 lo. 145 cars.
J. C. Missimer, *Supt*. ....Sloatsburg, N. Y
Suffolk Lumber R. R. 3 g. 15 m. 3 lo. 41 cars.
W. M. Whaley, *Supt*. ....Suffolk, Va.
Summit Branch R. R. 4-9 g. 20 m. 7 lo. 10 cars.
Thomas Gucker, *Supt*. ....Williamsport, Pa.
Susquehanna & Delaware River R. R. In progress.
D. Y. Kilgore, *Pres*. ....Philadelphia, Pa.
Sussex R. R. (*See Del., Lack. & West.*)
Syracuse, Binghamton & N. Y. R. R. (*See D. L. & W.*)
Syr., Ontario & N. Y. R. R.
Albert Allen, *Supt*. ....New York, N. Y.
Syracuse, Geneva & Corning
(*See Fall Brook Coal Co.*)

T

Tennessee Coal R. R. 5 g. 28 m. 8 lo. 204 cars.
A. M. Shook, *Gen. Man*. ......Tracy City, Tenn.
W. A. Knight, *M. M*. ....Tracy City, Tenn.
Tennessee & Sequatchee Valley R. R.
3 g. 42 m. 1 lo. 24 cars.
Chas. Clinton, *Gen. Supt*. ....Spring City, Tenn.
P. V. Mooney, *Pur. Agt*. ......Spring City, Tenn.
Terre Haute & Indianapolis R. R.
4–9 g. 421 m. 105 lo. 4,318 cars.
Joseph Hill, *Gen. Supt*. ....St. Louis, Mo.
C. R. Peddle, *P. Agt*. ....Terre Haute, Ind.
Geo. H. Prescott, *S. M. P. & M*. Terre Haute, Ind.
F. C. Cleaver, *M. M*. ....Terre Haute, Ind
E. D. Carter, *M. C. B*. ....Terre Haute, Ind.
Chas. Butler, *M. M*. ....Effingham, Ill.
Clinton Idler, *Foreman* ....Indianapolis, Ind)
Terre Haute & So.-Eastern Ry. 4–9 g. 44 m. 2 lo. 145 c.
Geo. Atherton, *Supt*. ....Terre Haute, Ind.
Texas-Mexican Ry. (*See Mex. Nat.*)
Texas Trunk R. R. 4–8½ g. 36 m. 2 lo. 8 cars)
Hugh Irwin, *Gen. Supt*. ....Dallas, Tex.
Texas Western Ry. 3 g. 52 m. 2 lo. 44 cars.
Henry Hatch, *Gen. Man*. ....Houston, Tex.
T. F. Glispin, *M. M*. ....Houston, Tex.
Texas & N. O. R. R. (*See Cen. Pac.; G. H. & S. A. Div.*.
Texas & Pacific. (*See Mo. Pac. Ry.; (6) Div*
Texas & St. Louis Ry. 3 g. 769 m. 84 lo. 2,000 cars.
S. W. Fordyce, *Rec. and Gen. Man*. St. Louis, Mo.
C. S. Brooke, *Pur. Agt*. ....St. Louis, Mo.
M. C. B. ....Pine Bluff, Ark.
Mo. & Ark. Div.:
J. W. Brown, *Supt*. ....Pine Bluff, Ark.
Rich. Williams, *M. M*. ....Pine Bluff, Ark.
Tex. Div.: H. Flanders, *Supt*. ....Tyler, Tex.
W. J. Lewis, *M. M*. ....Tyler, Ark.
Tionesta Valley R. R. 3 g. 15 m.
George Dickinson, *Gen. Supt*. ....Sheffield, Pa.
Tioga R. R. 4–8½ and 6 g. 67 m. 18 lo. 960 cars
L. H. Shattuck, *Supt*. ....Blossburg, Pa.
J. C. Guthrie, *Pur. Agt*. ....New York, N. Y.
Pere Bonny, *M. M*. ....Blossburg, Pa.
D. H. Stratton, *M. C. B*. ....Blossburg, Pa.
Toledo, Ann Ar. & No. Mich. Ry.
4–8½ g. 63 m. 9 lo. 186 c.
J. M. Ashley, *Gen. Man*. ......Ann Arbor, Mich.
H. W. Ashley, *Supt. & Pur. Agt*. do
C. C. Dodge, *M. M*. ....Ann Arbor, Mich.
Toledo, Cin. & St. Louis R. R. 3 g. 798 m. 101 lo. 3,500 c.
W. H. Pettibone, *Gen. Supt*. ....Toledo, O.
F. W. Stewart, *P. Agt*. ....Toledo, O.
Thos. Robertson, *M. M*. ....Delphos, O.
Toledo Div.: W. H. Vandergrift, *Supt*.; do
J. S. Wiers, *For. Car Rep*. ....Delphos, O.
St. Louis Div.: Frank F. Allen....Charleston, Ill.
P. H. Murphy, *M. M*. ....Charleston, Ill.
Toledo, Peoria & Western R. R. 4–8½ g. 223 m.
E. N. Armstrong, *Supt*. ....Peoria, Ill.
Toledo & Indianapolis R. R. 4–8½ g. 43 m. 4 lo. 118 c.
David Robison, Jr., *Rec*. ....Toledo, O.
Toledo & Ohio Central R. R.
4–8½ g. 325 m. 46 lo. 4,760 cars.
T. M. Peelar, *Supt*. ....Bucyrus, O
F. W. Stewart, *Pur. Agt*. ....Toledo, O.
J. B. Morgan, *M. M*. ....Bucyrus, O.
Tonawanda Val. & Cuba R. R. (*See Brad., B. & K.*)
Toronto, Grey & Bruce Ry. (*See Canadian Pacific.*)
Toronto & Nipissing Ry. (*See Mid. Ry. of Can.*)
Troy & Boston R. R. 4–8½ g. 48 m. 20 lo. 484 cars.
D. Robinson, *Pres*. ....Troy, N. Y.
Joseph Crandell, *Supt*. ....Troy, N. Y.
C. H. Hubbell, *Pur. Agt*. ....Troy, N. Y.
Z. B. Davis, *M. M*. ....Troy, N. Y.
A. Brewer, *M. C. B*. ....Troy, N. Y.
Troy & Greenfield R. R. & H. Tunnel. 4–8½ g. 44 m.
A. W. Locke, *Man*. ....North Adams, Mass.
Tuckerton R. R. 4–9 g. 31 m. 2 lo. 29 cars
J. J. Pharo, *Supt. & Pur. Agt*. Tuckerton, N. J.

U

Ulster & Delaware R. R. 4–8½ g. 74 m. 10 lo. 218 cars.
Jas. H. Jones, *Supt*. ....Rondout, N. Y.
John H. Decker, *M. C. B*. ....Rondout, N. Y.
Union Ry. 5 g. 9 m. 3 lo.
C. E. James, *Pres*. ....Chattanooga, Tenn.
D. J. O'Connell, *Gen. Man*. Chattanooga, Tenn.
Union Pacific Ry. (7 Gen. Divs.)
3 & 4–8½ g. 4,633 m 510 lo. 10,550 cars.
S. R. Callaway, *Gen. Man*. ....Omaha, Neb.
S. T. Smith, *Gen. Supt*. ....Omaha, Neb.
Thos. L. Kimball, *Asst. Gen. Man*. Omaha, Neb.
J. J. Burns, *Gen. Store Keeper*. ..Omaha, Neb.
I. H. Congdon, *S. M. P. & C. D*. ..Omaha, Neb.
John Wilson, *Asst. do* ....Omaha, Neb.
(1) Neb. Div.: O. H. Dorrance, *Gen. Supt*. Omaha, Neb.
E. Div.: C. B. Havens, *Supt*. ....Omaha, Neb.
J. H. McConnell, *M. M*. ....Omaha, Neb.
A. M. Collett, *M. C. B*. ....Omaha, Neb.
L. Pole Div.: W. A. Deuel, *Supt*. .Cheyenne, W. T
J. H. McConnell, *M. M*. ....N. Platte, Neb.
(2) Wy. Div.: E. Dickenson, *Gen. Supt*. .Laramie, W. T.
T. A. Davis, *M. M*. ....Laramie, W. T.
Wes. Div.: C. E. Wurtelle, *Supt*. Evanston, W. T.
Geo. F. Chapman, *M. M*. ......Evanston, W. T.
(3) Idaho Div.: R. Blickenderfer, *Gen. Supt*. Ogden, U.
John S. Hickey, *M. M*. ....Shoshone, Id.
Ogden Short Line Div.:
R. Blickensderfer, *Supt*. ....Pocatello, Id.
Utah & Northern Div.:
J. S. Hickey, *M. M*. ....Eagle Rock, Id.
J. W. Paul, *Gen. For. C. D*. ..Eagle Rock, Id
(4) Col. Cent. Div.: A. A. Egbert, *Gen. Supt*. Denver, Col
E. Dickinson, *Asst. Gen. Supt*. ....Denver, Col
F. Mertsheimer, *M. M*. ....Denver, Col.
C. C. Div.: P. Touhy, *Supt*. ....Denver, Col.
So. Park Div.: J. T. Choate, *A. Supt*. .Como, Col.
(5) Kan. Div.: H. O. Brinkerhoff, *G. Supt*. Kan. City, Mo.
K. Pac. Div.: J. O. Brinkerhoff, *Supt*. Kan. C'y, Mo.
J. O. Chapman, *M. M*. ......Armstrong, Kan.
T. B. Roberts, *M. C. B*. ......Armstrong, Kan.
Kansas Central Div.:
J. O. Brinkerhoff, *Supt*. .Leavenworth, Kan.
Smoky Hill Div.:
O. H. Dorance, *Supt*. ....Wallace, Kan.
J. B. Dailey, *Asst. M. M*. ....Ellis, Kan.
(6) Salt Lake & Western Div.:
W. W. Ritter, *Supt*. ....Salt Lake City, Utah.
United States Rolling Stock Co. 19 lo. 4,692 cars.
A. Hegewisch, *Pres*. ....New York, N. Y.
W. H. Chaddock, *Gen. Agt*. ....Chicago, Ill.
Utah Central Ry. 4–8½ g. 280 m. 21 lo. 358 cars.
John Sharp, *Gen. Supt*. ..Salt Lake City, Utah.
S. H. Hill, *Pur. Agt*. ......Salt Lake City, Utah.
Geo. G. Bywater, *M. M*. ..Salt Lake City, Utah
Peter Reid, *M. C. B*. ....Salt Lake City, Utah.
Utah & Nevada Ry. 3 g. 37 m. 3 lo. 33 cars
W. W. Ritter, *Gen. Man*. ..Salt Lake City, Utah.
Robert Anderson, *M. M*. ..Salt Lake City, Utah.
Utah & Northern Ry. (*See Union Pac.; (3) Div.*)
Utah & Pleasant Valley Ry. (*See Den. & Rio. Gr.*)
Utica, & Black Riv. R. R. 4–8½ g. 180 m. 25 lo. 412 c.
E. A. Van Horne, *Gen. Supt. & P. A*. .Utica, N. Y.
H. W. Hammond, *Asst. Supt*. ....Utica, N. Y.
John Bailey, *M. M*. ....Utica, N. Y.
David James, *M. C. B*. ....Utica, N. Y.

V

Vaca Vall. & Clear Lake R. R. 4–8½ g. 30 m. 2 lo. 19 c.
G. B. Stevenson, *Gen. Supt*. ......Vacaville, Cal.
Valley Ry. (Ohio) 4–8¾ g., 75 m. 20 lo. 889 cars.
Isaac Reynolds, *Gen. Man*. ....Cleveland, O.
H. Melcher, *Pur. Agt*. ....Cleveland, O.
C. T. Johns, *M. M*. ....Cleveland, O.
Valley R. R. Va. 4-8½ g. 62 m
S. Spencer, *Pres*. ....Baltimore, Md.
Vicksburg & Brunswick R. R. (*See Cen. of Ga.*)
Vicksburg & Meridian R. R. (*See Cin., N. O. & Tex. Pac.*)
Vicks. Shreveport & Pac. R. R. (*See C., N. O. & T. P.*)
Victoria Ry. (*See Midland Ry. of Can.*)
Virginia Midland Ry. (*See Rich. & Dan.; (4) Div.*)
Virginia & Truckee R. R. 4–8½ g. 52 m. 14 lo. 322 c.
Carson & Colorado R. R. 3 g. 294 m. 8 lo. 228 c.
H. M. Yerington, *Gen. Supt*. ......Carson, Nev.
R. J. Laws, *A. Supt*. (C. & Col.) Hawthorne, Nev.
Hume Yerington, *Pur. Agt*. ....Carson, Nev.
I. N. Fording, *M. M*. ....Carson, Nev.
M. M. Hyde, *M. C. B*. ....Carson, Nev.

W

Wabash, Chester & W'n R. R. (*See St. Louis Coal.*)
Wabash, St. Louis & Pacific Ry. (4 Gen. Divs.)
4–8½ g. 3,241 m. 598 lo. 17,230 cars.
Jas. F. Joy, *Pres*. ....St. Louis, Mo.
A. L. Hopkins, *V. P*. ....St. Louis, Mo.
A. A. Talmage, *Gen. Man*. ....St. Louis, Mo.
H. H. Wellman, *Pur. Agt*. ....St. Louis, Mo.
J. B. Barnes, *Supt. M. P. & M*. .Springfield, Ill.
M. M. Martin, *Supt. Car Dept*. ......Decatur, Ill.
(1) Eas'n Div.: G. W. Stevens, *Supt*. ....Peru, Ind.
W. S. Morris, *M. M*. ....Fort Wayne, Ind.
A. W. Quackenbush, *Asst. M. M*. ..Peru, Ind
Thos. Anderson, *M. C. B*. ....Peru, Ind.
(2) Middle Div.: K. H. Wade, *Supt*. ......Decatur, Ill.
C. F. Lape, *M. M*. ....Springfield, Ill.
B. B. Rose, *M. C. B*. ....Decatur, Ill.
G. A. Hurd, *Asst. Supt*. ....Decatur, Ill.
E. B. Hyde, *Asst. Supt* ....Havana, Ill.
(3) Western Div.: R. G. Butler, *Supt*. ...Moberly, Mo
J. K. Lape, *M. M*. ....Moberly, Mo.
John Lang, *M. C. B*. ....Moberly, Mo.
D. Moin. Div.: C. F. Meek, *A. Supt*. Des Moines, Ia
Walden's Bridge R. R. 3 g. 23 m. 3 lo. 37 cars.
John G. Scott, *Gen Man*. ....Jenks P. O., Tenn.
Wallkill Valley.
J. E. Childs, *Gen. Supt*. ....New York, N. Y.
Geo. H. Graves, *Supt*. ....Kingston, N. Y
E. Minshull, *M. M*. ....Middletown, N. Y.
I. W. Fowler, *Pur. Agt*. ....Middletown, N. Y.
Walla Walla & Columbia Riv. R. R. (*See Ore. Ry.*)
Walton R. R. 5 g. 10 m. 1 lo. 7 cars.
D. H. Walker, *Pres* ....Monroe, Ga.
Warren & Farnsworth Valley R. R.
3 g. 16 m. 3 lo. 39 cars.
A. D. Wood, *Gen. Man*. ....Warren, Pa.
Warwick Valley R. R. (*See Leh. & Hud. River.*
Washington, Ohio & West. R. R. 4–8½ g. 52 m. 5 lo. 87 c
S. M. Brophy, *Supt* ....Alexandria, Va
W. Mountjoy, *Act. For*. ....Alexandria, Va
John Harrison, *M. C. B*. ....Alexandria, Va
Waynesburg & Washington Rd. 3 g. 29 m. 3 lo. 26 c
C. E. Bower, *Supt*. ....Waynesburg, Pa.
A. M. Kline, *M. C. B*. ....Waynesburg, Pa.
Welland Ry. 4–8½ g. 25 m. 4 lo. 147 cars.
William Pay, *Supt*. ....St. Catharines, Ont.
Jas. Taylor, *M. M*. ....St. Catharines, Ont.
Wm. H. Pay, *M. C. B*. ......St. Catharines, Ont.
West Feliciana R. R. 4–8½ g. 27 m. 2 lo. 22 cars.
J. B. McGehee, *Pr. & Gen. Supt*. Bayou Sara, La.
J. A. Tilton, *M. M. & C. B*. ......Bayou Sara, La
W. Va., Central & Pittsb'g Ry. 4-8½ g. 50 m. 4 lo. 119 c.
T. B. Davis, *Gen. Man*. ....Piedmont, W. Va
W. E. Porter, *Gen. Supt*. ......Piedmont, W. Va.
Geo. W. Harrison, *Pur. Agt*. ..Piedmont, W. Va
E. W. Lippencott, *M. M*. ....Piedmont, W. Va.
West & East R. R. (*See Ill. Cen.; N. O. Div.*)
West Jersey R. R. (*See Penn. R. R.; (3) Div.*)
Western R. R. (of Ala.) 5 g. 85 m. 15 lo. 270 cars.
Atlanta & W. Point Rd. 5 g. 87 m. 14 lo. 240 c.
Cecil Gabbett, *Gen. Man. & Supt*. ..Mont., Ala.
C. D. Wall, *M. M. & C. B*. ....Montgomery, Ala
Western Counties' Ry. 4–8½ g. 67 m. 8 lo. 137 cars
J. Brignell, *Supt*. ....Yarmouth, N. S.
Western Maryland R. R. 4–8½ g. 127 m. 28 lo. 610 c.
J. M. Hood, *Pr. & Gen. Man*. ....Baltimore, Md.
R. J. Adair, *Pur. Agt*. ....Baltimore, Md.
David Holtz, *Mast. of Mach*. .Union Bridge, Md.
J. H. Nussear, *M. C. B*. ....Union Bridge, Md.
Western No. Carolina R. R. 5 g. 210 m. 17 lo. 160 c.
V. E. McBee, *Supt*. ....Salisbury, N. C.
Jos. P. Minetree, *Pur. Agt*. ....Richmond, Va
G. W. Gates, *M. M*. ....Salisbury, N. C.
Western & Atlantic R. R. 5 g. 138 m. 58 lo. 952 c.
R. A. Anderson, *Gen. Supt*. ....Atlanta, Ga.
A. B. Bostwick, *Asst. Supt*. ....Atlanta, Ga.
Lamar Collier, *M. M*. ....Atlanta, Ga
Wm. Kinyon, *M. C. B*. ....Atlanta, Ga.
Wheeling, Pittsburg & Baltimore R. R. (*See B. & O.*)
Wheeling & Lake Erie R. R. 267 m. 37 lo. 1,922 c.
M. D. Woodford, *Rec. & Gen. Man*. .Toledo, O.
O. P. Dunbar, *Gen. M. M*. ....Norwalk, O.
John Hillhouse, *Div. M. M*. ....Norwalk, O.
Cleve. & Mar. Div.: P. Pease, *Rec. & Gen. Man*.
Alex. Galloway, *M. M*. ....Cambridge, O.
Whitby, Port Perry & Lindsay Ry. (*See Mid. of Can.*)
White Water R. R. (*See Ft. W., Cin. & Lou.*)
Whitefield & Jefferson R. R. (*See Bos., Con. & Mon.*)
Whitneyville & Machiasport R. R. 8 m. 2 lo. 48 c.
C. Sullivan, *G. M. & Pur. Agt*. Whitneyville, Me.
Wicomico & Pocomoke R. R. 4-8½ g. 30 m. 2 lo. 38 c.
L. Showell, *Pres*. ....Berlin, Md.
Williamsport & North Branch R. R.
4–8½ g. 14 m. 2 lo. 4 cars.
B. G. Welch, *Man. & P. Agt*. ..Hughesville, Pa.
Williamstown & Del. River R. R.
4–8½ g. 27 m. 1 lo. 12 cars.
Samuel Garwood, *Supt*. ..Williamstown, N. J
Wilmington, Columbia & Augusta R. R. (*See W. & W.*)
Wilmington & No'n R. R. 4–8¾ g. 85 m. 17 lo. 155 c.
A. G. McCausland, *Supt. & P. A*. Wilmington, Del
George Rommel, *M. M*. ....Wilmington, Del.
Alex. Maitland, *M. C. B*. ....Wilmington, Del.
Wilmington & Weldon; Northeastern; S. C. Central; Cheraw & Darlington; Cheraw & Salisbury; and Wilmington, Columbia & Augusta R. Rs.
4–8½ g. 682 miles 104 locomotives 1,725 cars.
H. Walters, *Gen. Man*. ....Baltimore, Md.
J. F. Divine, *Gen. Supt*. ....Wilmington, N. C.
John Bisset, *M. M*. ....Wilmington, N. C.
W. H. Day, *M. C. B*. ....Florence, S. C.
J. H. Davis, *M. C. B*. (W. & W.). Wilmington, N. C
Winifrede R. R. 4–9 g. 5 m. 1 lo. 65 cars.
Theodore Wright, *Pres*. ....Philadelphia, Pa.
Windsor & Annapolis Ry. 4–8½ g. 130 m. 10 lo. 160 c.
P. Innes, *Gen. Man*. ....Kentville, N. S.
Wm. Yould, *M. M*. ....Kentville, N. S.
Wm. Grierson, *M. C. B*. ....Kentville, N. S.
Wisconsin Central R. R. 4–8½ g. 480 m. 59 lo. 1,800 c
F. N. Finney, *Gen. Man*. ....Milwaukee, Wis.
A. A. Allen, *Asst. Gen. Man*. ..Milwaukee, Wis.
E. K. Howes, *Pur. Agt*. ....Milwaukee, Wis.
H. A. Barnes, *M. M*. ....Stevens Pt., Wis.
Mil. East. & No. Divs.:
F. A. Merrill, *Supt*. ....Milwaukee, Wis.
Wis. & Minn. and Minn. St. C. & Wis. R. R.'s.:
G. T. Wiswell, *Supt*. ......Chippewa Falls, Wis.
Mid. & No. Div.: P. Walling, *Supt*. Mil'ukee, Wis
Wisconsin, Iowa & Nebraska.
G. C. McMichael, *Supt*. ....Marshalltown, Ia.
J. V. Johnston, *Pur. Agt*. ......Marshalltown, Ia
M. C. Wheeler, *M. M*. ....Marshalltown, Ia.
Wisconsin & Michigan R. R. (*See Mil. & North'n.*)
Wisconsin & Minnesota R. R. (*See Wis. Cen.*)
Woodruff Sleeping & Parlor Coach Co.
Job H. Jackson, *Pres*. ....Philadelphia, Pa.
Wm. G. Johnston, *V-Pres*. ....Philadelphia, Pa.
J. C. Paul, *Gen. Man*. ....Philadelphia, Pa.
R. A. Rutherford, *Supt*. ....Philadelphia, Pa.
Wood River Branch R. R. 4–8½ g. 6 m. 2 lo. 3 cars.
L. M. Barber, *Supt*. ....Hope Valley, R. I.
Woodstock R. R. 4–8½ g. 14 m. 1 lo. 3 cars.
J. G. Porter, *Supt*. ....Woodstock, Vt.
Worcester, Nashua & Rochester R. R.
4–8½ g. 95 m. 20 lo. 523 cars.
Chas. Howard, *Gen. Man*. ....Worcester, Mass.
G. W. Hurlburt, *Supt*. ....Worcester, Mass.
A. R. Barrett, *M. M. & C. B*. ..Worcester, Mass
Worcester & Shrewsbury R. R. 3 g. 3 m. 3 lo. 9 c.
J. F. Bigelow, *Supt*. ....Worcester, Mass.
G. E. Hapgood, *Pur. Agt*. ....Worcester, Mass.
Chas. Cleveland, *M. M*. ....Worcester, Mass.
Worcester & Somerset R. R. (*See N. Y., Phil. & Nor.*)

Y

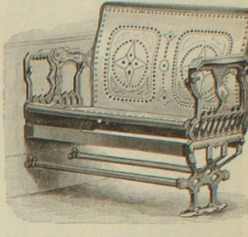
York & Peach Bottom Ry. 3 g. 40 m. 5 lo. 100 c.
S. M. Manifold, *Supt. & Pur. Agt*. ....York, Pa.
G. W. Hoover, *M. M*. ....York, Pa.

BOUND VOLUMES OF THE
NATIONAL CAR-BUILDER
For 1880, 1881, 1882, 1883 and 1884.
PRICE $3 EACH.

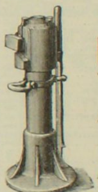
WILLIAMSON & CASSEDY.
Railway, Machinists' and Steamship
SUPPLIES OF EVERY DESCRIPTION
24 South Fourth Street,
PHILADELPHIA.

STEEL CASTINGS
RAILROAD and MACHINE
CASTINGS.
¼ lb. to 10 Tons.
LOCOMOTIVE CROSS HEADS
AND GEARING A SPECIALTY.
Eureka Cast Steel Company.
307 Walnut St., Philadelphia, Pa.

GARDNER, HOLMES & CO.
SUCCESSORS TO
GARDNER & CO.

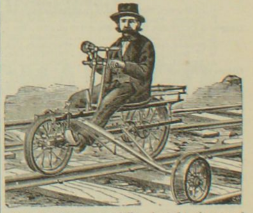


PATENTEES AND MANUFACTURERS OF
PERFORATED
Veneer Car Seats,
FOR STEAM AND STREET CARS,
DEPOT SEATING.
3-PLY
Veneer Car Ceiling.
Birch Veneer a specialty, any size panel, without joint, plain and decorated.
STREET CAR PANELS.
SEND FOR R. R. CATALOGUE.
183 Canal St., New York.



HYDROSTATIC
MACHINERY,
JACKS,
PUNCHES,
PRESSES,
PUMPS,
ACCUMULATORS,
VALVES,
FITTINGS, ETC.
Watson & Stillman,
468 B Grand Street.
NEW YORK.

The Sheffield Velocipede Hand-Car



This Hand-Car is especially adapted to the use of **Road-Masters, Bridge Inspectors, Telegraph Line Repairers, Track Inspectors, Track Walkers, Wood** and **Tie Inspectors** and for all work where one or two men wish to go over the line at will. Also, our Telegraph Cars, capable of carrying two men and material. Light, Easily Handled, and when ready for shipment occupy very little space in Baggage Car—a great advantage to railroad men. Run easily, being propelled by the **ROWING MOVEMENT.** Can be run short distances at the rate of **20 Miles an hour; and will not jump the track.**
HENRY W. PEABODY & CO.,
MASON BUILDING, BOSTON.
GENERAL PURCHASING AGENTS
For Foreign Railway and Tramway Companies

THIS HAMMER
AWARDED THE FIRST PREMIUM OF A SILVER MEDAL

POWER
"THE PALMER"
SPRING HAMMER

AT THE
American Institute Fair,
N. Y. CITY, NOV., 1873.
Superior in every point to any modification of the Trip Hammer. Simple, Powerful, Efficient and Cheap. Four sizes now being built. For Prices and Descriptive Circulars, address the manufacturers.
S. C. FORSAITH & CO.,
Manchester, N. H.,
who are also builders of the
Abbe Bolt-Heading Machine

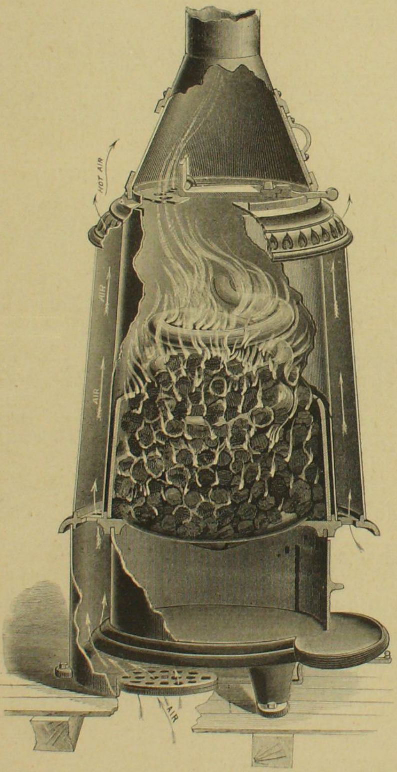
THE BAKER HEATER CO.,

W. C. BAKER, President (late of Baker, Smith & Co.),

SOLE PROPRIETORS AND MANUFACTURERS

OF THE

Perfected Baker Car Heater



Which is the Original Baker Heater, with Numerous Notable Improvements, Suggested by Long Experience.

SEE DESCRIPTIVE AND ILLUSTRATED PAMPHLET.

72 Broadway, - - New York.

ENTRANCE ALSO 13 NEW STREET.

NATHAN H. DAVIS, Prest. LEWIS C. GRATZ, Treas. HENRY AVERY, Jr., Secretary

DIAMOND STATE CAR SPRING CO.

WORKS:
WILMINGTON, DELAWARE.

OFFICES:
411 & 413 WALNUT ST., PHILA.

LICENSED TO MANUFACTURE EDGE-ROLLED SPRINGS OF EVERY VARIETY.

ELLIPTIC, LOCOMOTIVE,

Flat and Round Bar Car Springs.

SPIRAL SPRINGS

OF EVERY DESCRIPTION.

Davis' Patent Bolster Draw,

BUFFER AND EQUALIZING SPRINGS.

IMPROVED BAND FOR LOCOMOTIVE SPRINGS.

VULCAN JOURNAL BEARINGS.

CHAS. W. PICKERING, Chairman. FRANK S. LAYNG, Sec'y and Treas.

PICKERING SPRING CO. Limited,

MANUFACTURERS OF

RAILWAY and MACHINERY SPRINGS

Boston:
H. L. Leach, Agt.

PHILADELPHIA.

C. R. Kearns,
Southern Agent.

JAMES JEFFRIES & SONS,

MANUFACTURERS OF

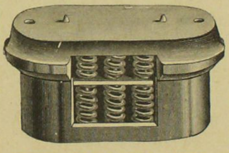
ELLIPTIC & HALF ELLIPTIC CAST-STEEL SPRINGS,

For Railroad Cars and Locomotives.

813 JAYNE STREET, PHILADELPHIA, PA.

THE

ORIGINAL A. B. DAVIS SPIRAL CAR SPRINGS



EVERY SPRING GUARANTEED.

Manufactured Only

BY THE

A. B. DAVIS CAR SPRING CO.

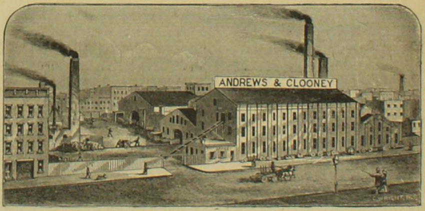
(Limited)

S. W. Cor. 23d and Hamilton Sts.,

PHILADELPHIA.

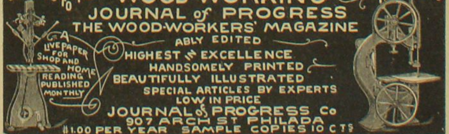
ANDREWS & CLOONEY,

GLOBE IRON AND COLUMBIA CAR SPRING WORKS.



Office, 545 West Thirty-third Street; Works, 535 to 551 West Thirty-third Street and 538 to 552 West Thirty-fourth Street.
NEW YORK.

Manufacturers of Elliptical, Spiral, Volute Car and Engine Springs, Car Wheels, Axles, Pedestals Brake Shoes, Boxes, Brass Bearings and Castings of all descriptions where great strength is required. Also, Sweepers Snow-Plows, Turn-tables, Automatic Switches, Track Work, tc.



DEVOTED TO THE WOOD-WORKING INTERESTS

JOURNAL of PROGRESS

THE WOOD-WORKERS' MAGAZINE

A LIVE PAPER FOR SHOP AND HOME READING

PUBLISHED MONTHLY

ABLY EDITED

HIGHEST IN EXCELLENCE

HANDSOMELY PRINTED

BEAUTIFULLY ILLUSTRATED

SPECIAL ARTICLES BY EXPERTS

LOW IN PRICE

JOURNAL of PROGRESS Co

907 ARCH ST PHILADA

$1.00 PER YEAR SAMPLE COPIES 10 CTS

Railroad Journal Bearings

BRASS CASTINGS.
BABBITT METAL.
SOLDERS.

DEALERS IN

All Kinds of Metals.

J. J. RYAN & CO.,

62 & 64 West Monroe Street, Chicago

PARROTT VARNISH COMPANY,

MANUFACTURERS OF FINE

RAILWAY VARNISHES,

BRIDGEPORT, CONN.

UNITED STATES CAR COUPLER.

Recommended by the Master Car-Builders at Saratoga in 1884.
Prescribed by the Massachusetts Board of Railroad Commissioners in 1885.

Total Cost Per Car, including Royalty, $13.

Entire Saving of Pins. Automatic with the Common Draw-bar or any other form presenting the Link. Self-couples with Draw-bars with a variation of six inches in height. No change of Draw-timbers.

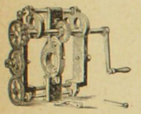
COST OF APPLICATION THE SAME AS THE OLD FORM.

Adopted as the standard by the Boston & Lowell, Boston & Maine, Eastern, Maine Central, European & North American, Boston, Concord & Montreal, Northern, Concord, Connecticut and Passumpsic, Ogdensburg & Lake Champlain, and other roads.

UNITED STATES CAR COUPLER CO.,
4 Sears Building, Boston, Mass.
T. W. FAWCETT, Western Agent, - - 225 E. Kinsie St., Chicago, Ill.

PATENT PORTABLE CROSS-HEAD

PIN TURNING MACHINE.



For turning CROSS-HEAD PINS or WRIST PINS when cast or forged solid in Locomotive Cross-Heads.

Descriptive circulars on application. Send stamp for Catalogue.

L. B. FLANDERS MACHINE WORKS,

PEDRICK & AYER, Proprietors,
PHILADELPHIA, PA.

THE PATENT SHAFT AND AXLETREE CO.

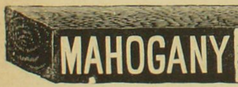
(LIMITED),
OF WEDNESBURY, ENGLAND,
MANUFACTURERS OF
Wrought-Iron Steel Tyred Engine and Car Wheels, Iron and Steel Axles, Locomotive and Car Wheel Tyres, Etc., Etc.

Represented in the United States by
W. R. ELLIS.

NEW YORK:
No. 18 BROADWAY, Room 620.

BOSTON:
No. 139 MILK STREET.

WM. E. UPTEGROVE & BRO.



We receive our Mahogany in the log direct from the vessel, operate our own mills, and deliver the lumber direct to the manufacturer.

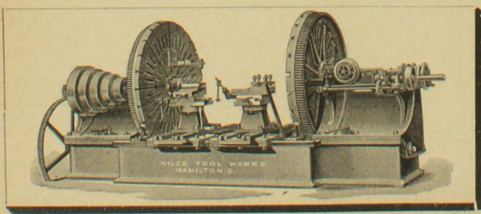
SAW MILLS AND OFFICE Foot 10th & 11th Streets, East River NEW YORK.

JOHN R. GRAHAM, Jr.,
IMPORTER AND DEALER IN
ROSEWOOD & MAHOGANY
AND ALL OTHER
FOREIGN AND DOMESTIC
CABINET WOODS,
SUITABLE FOR CAR WORK.
Cor. 11th Ave. and 30th St.
NEW YORK.

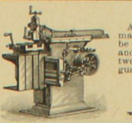
Fine Coach and Railway Varnishes.

CLARENCE BROOKS & CO.
MANUFACTURERS OF
VARNISHES,
Cor. West and West 12th Streets,
NEW YORK.

SEND FOR PRICE LIST.



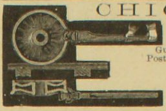
THIS SHAPER HAS 26-INCH STROKE.



All the adjustments are made without operator moving from his position. It is made to act as a SLOTTING MACHINE, and is so arranged that KEY SEATS may be cut in any part of a shaft, of any length, and from 4 inches diameter down, and will plane a block 26″ × 26″ × 20″. Has SWIVEL GRADUATED VISE, two changes of speed, and is geared 36 to 1. Is very heavy and powerful, and is guaranteed to give perfect satisfaction.

MANUFACTURED BY
LODGE, BARKER & CO., Cincinnati, O.,
Manufacturers of Iron and Brass Working Machinery.

CHICAGO CAR MOVER.



With it One Man can move a loaded car.
WEIGHT, including Handle, 15 lbs.
Guaranteed not to break or get out of order. Sent on 30 days' trial. Send Postal for Sample, and you will use no other.
Price, Single Movers, $6.00; Per Pair, $10.00.
Special discount to Railway Companies.
Address J. H. BANNON, Manufacturer.
Room 62, 220 S. Clark St., Chicago, Ill.

POILLON & STAPLES,
MANUFACTURERS OF
COACH and CAR VARNISHES.
Works and Office: East 148th St., cor. Fourth Avenue, New York.

ROCHESTER CAR WHEEL WORKS.

OFFICE AND WORKS:

No. 8 BROWN'S RACE STREET, ROCHESTER, N. Y.

MANUFACTURERS OF

RAILROAD CAR WHEELS

Of Best Quality.

WM. H. BARNUM, Pres't. WM. K. CHAPIN, Vice-Pres't. CHAS. T. CHAPIN, Sec. and Treas.

WE WILL ONLY MAKE A FIRST-CLASS WHEEL.

GRIFFIN CAR WHEEL CO.,

DETROIT, MICH.

GRIFFIN & WELLS FOUNDRY CO.,
CHICAGO, ILL.

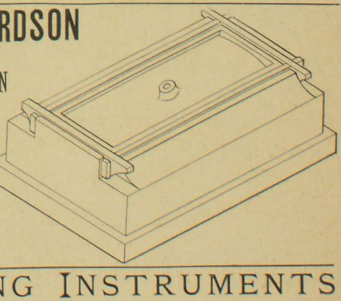
THOMAS F. GRIFFIN & SONS,
BUFFALO, N. Y.,

MANUFACTURERS OF
RAILROAD CAR WHEELS AND CASTINGS.

Annual Capacity, 250,000 Wheels. 15,000 Tons Castings

THE RICHARDSON

AND THE
ALLEN-RICHARDSON
BALANCE
Slide-Valves.



MANUFACTURED BY
F. W. RICHARDSON,
TROY, N. Y.

DRAWING INSTRUMENTS

AND MATERIALS OF ALL KINDS.

CATALOGUES ON APPLICATION.

W. Y. McALLISTER, Successor to

OSWALD McALLISTER,
1226 CHESTNUT STREET,
Philadelphia, Pa.